



REGIONAL CO-OPERATIVE AGREEMENT
INTERNATIONAL ATOMIC ENERGY AGENCY



REPORT

FOURTEENTH WORKING GROUP MEETING
OF
REPRESENTATIVES OF RCA MEMBER STATES

Tokyo, Japan, 24 - 27 March 1992

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TABLE OF CONTENTS

	<u>Page</u>
Inaugural Session	1
First Administrative Session	
. Election of Chairman	2
. Adoption of Agenda	2
. Draft RCA Annual Report 1991	2
. Election of Project Committees	3
First Technical Session	
. Report on 1991 Activities	4
. New UNDP/RCA Project Proposal	7
. Bridging Activities for 1992	8
. New Project Proposal from Australia	9
Second Technical Session: Medical and Biological Applications of Nuclear Techniques.	10
Third Technical Session: Agricultural Projects	14
Fourth Technical Session: Research Reactor, Energy-Based and General Projects	17
Fifth Technical Session: Radiation Protection Projects	19
Second Administrative Session	
. Renewal of RCA Agreement	23
. RCA Action Plan for 1992	24
. RCA Cost Projections for 1992	25
. Other business	25
Closing Session	27

LIST OF ANNEXES

Annex 1	List of participants and observers
Annex 2	Welcome address by Mr. H. Ishida Director-General, Atomic Energy Bureau, Science and Technology Agency
Annex 3	Welcome address by Mr. Noramly bin Muslim, Deputy Director General, Department of Technical Cooperation, IAEA
Annex 4	Opening address by Mr. Takaya Suto, Director-General, Scientific and Technological Affairs, Ministry of Foreign Affairs
Annex 5	Remarks by Interim Chairman, Mr. Nguyen Tien Nguyen, Director, Department of International Relations, VINATOM
Annex 6	Agenda
Annex 7	Draft Annual Report for 1991 - Report by RCA Coordinator
Annex 8	Letter from Mr. S. Zacharia to Mr. E. A. Polansky, 4 March 1992
Annex 9	Bridging Activities for 1992
Annex 10	Radioimmunoassay of Thyroid Related Hormones
Annex 11	Radioimmunoassay of Hepatitis B diagnosis
Annex 12	Radiation Sterilization of Biological Tissue Grafts
Annex 13	Imaging Procedures for the Diagnosis of Liver Diseases Phase II
Annex 14	Radioaerosol Imaging for the Diagnosis of Respiratory Diseases
Annex 15	Nuclear Instrument Maintenance
Annex 16	Opening Address by Project Committee Chairman, Dr. N. Murata
Annex 17	Food Irradiation Process Control and Acceptance (RPFI III)
Annex 18	Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen
Annex 19	Use of the Sterile Insect Technique to Protect Fruit and Vegetables from Destruction by Tropical Fruit Flies
Annex 20	Amelioration of Environmental Pollution by F-1 Sterility for Controlling Caterpillar Pests of Horticultural and Field Crops
Annex 21	Develop Strategies for Improving Animal Production and Health in Asia
Annex 22	Research Reactor Utilization

Annex 23	Pre-Project Activities and Manpower Development/Nuclear Power Project Planning
Annex 24	Nuclear Techniques in Development of Advanced Ceramic Technologies
Annex 25	Accelerator Based Technologies
Annex 26	Opening Address by Project Committee Chairman, Dr. S. Kobayashi
Annex 27	Radiation Protection Infrastructures, Report of 1991 Expert Advisory Group Meeting, Tokyo
Annex 28	Personal Dosimetry
Annex 29	Reference Asian Man
Annex 30	Survey and Control of Exposure in High Natural Background Radiation Areas
Annex 31	Radon Exposures in Occupational Work other than Uranium Mining
Annex 32	Training in Radiation Protection in the Mining and Milling of Radioactive Ores

Country Statements

Annex 33	Australia
Annex 34	China
Annex 35	India
Annex 36	Indonesia
Annex 37	Japan
Annex 38	Republic of Korea
Annex 39	Malaysia
Annex 40	Pakistan
Annex 41	Philippines
Annex 42	Sri Lanka
Annex 43	Thailand
Annex 44	Viet Nam
Annex 45	RCA Action Plan 1991-93
Annex 46	RCA Budget and Budget Estimates 1991-92

- Annex 47 New Project Proposal on Advanced Brachytherapy for Cancer Management
- Annex 48 Agreed text of letter to Mr. Sabastian Zacharia, Chief, Regional Bureau for Asia and the Pacific, UNDP New York
- Annex 49 Official closing by Mr. Sadayoshi Kobayashi on behalf of Mr. Yosiyuki Sadaoka.

RCA Working Group Meeting
Tokyo, Japan, 24 - 27 March 1992

The Fourteenth RCA Working Group Meeting was held at the Ministry of Foreign Affairs, Tokyo Japan, 24-27 March 1992. It was attended by 61 participants from 13 Member States (Annex 1). Singapore did not send a representative. There were two observers from Mongolia and 10 observers from Japan. The IAEA delegation was led by Professor Noramly bin Muslim, Deputy Director General, Department of Technical Cooperation. The numbering of the paragraphs in this report corresponds with the number of the Agenda item.

INAUGURAL SESSION

1. Welcome Address

The Meeting was opened by Dr. Hiroto Ishida, Director-General, Atomic Energy Bureau, Science and Technology Agency. In his welcoming address Dr. Ishida said that it was a great pleasure for him to be able to address the delegates. He reviewed the recent changes internationally and highlighted the need to strengthen non-proliferation of nuclear weapons. He said Japan considered it important to contribute to the international society especially in the development and utilization of nuclear energy. The mutual cooperation aims of RCA had been amply demonstrated over its 20 year history and he hoped the future activities would be as fruitful as the past. The full text is in Annex 2.

2. Welcome Address on Behalf of IAEA

In his address of welcome on behalf of the IAEA, the Deputy Director General, Professor Noramly bin Muslim reviewed changes that had occurred in RCA during his term as DDG over the past six years. He noted that the success of RCA over the past 20 years had been achieved because of Member States' will to concentrate on the technical challenges and expressed the hope for this continued regional cohesion. He also noted that, with the maturing of RCA and the enormous growth in the economies of the region, there was a need for Member States to move towards an ultimate goal of equal partnership, with both developing and developed countries contributing to assist the less well off. The full text is given in Annex 3.

3. Opening Address and Official Opening

The Opening Address and Official Opening of the Meeting was made by Mr. Takaya Suto, Director-General for Scientific and Technological Affairs, Ministry of Foreign Affairs.

Mr. Suto said that it was an honor for Japan to host the 14th RCA Working Group Meeting. He remarked that the role of the IAEA was becoming increasingly important and

nuclear energy was playing an important role through the applications in agriculture, industry, radiation protection, medicine and the like. These technologies have been used to advantage in the RCA countries and Japan will continue to support these activities. He said that the principle of scrap and built needed to be explored when considering new projects because of the limited RCA budgets. He paid tribute to Dr. Noramly's contribution and wished the meeting success. A full text is given in Annex 4.

FIRST ADMINISTRATIVE SESSION

The first administrative session was opened by the interim Chairman Mr. Nguyen Tien Nguyen, Director, Department of International Relations, VINATOM. He thanked delegates for their support over the past year and called for nominations for the Chairman of the Meeting.

A full text is given in Annex 5.

4. Election of Chairman

Mr. Yoshiyuki Sadaoka, Director, Nuclear Energy Division, United Nations Bureau, Ministry of Foreign Affairs was nominated by the Philippines, seconded by Indonesia and unanimously elected Chairman. Mr. Sadaoka thanked the delegates for their support. He commented that he had been a member of the Scientific Affairs Division at the time of the entry of China into RCA and had been personally involved in these activities. From this start, he had maintained a close and personal interest in RCA matters. He expressed satisfaction at the high level of representation of Member States and looked forward to fruitful discussions on the RCA activities.

5. Adoption of Agenda

The draft Agenda was discussed and it was proposed that the second Administrative Session be transferred from the afternoon of Friday 27 March to the afternoon of Wednesday 25 March to follow the Fifth Technical Session. This arrangement would allow more time to review the draft documents. The adopted Agenda is given in Annex 6.

6. Draft RCA Annual Report, 1991

In his comments on the Annual Report, the RCA Coordinator defined the purpose of the report as both an historic record of the activities, events and personnel involved during 1991 and a reference containing the essential details on RCA in one document.

He cited the extensive, well developed networking system of coordinators and counterparts at the project and sub project level in RCA as one of the reasons for the high level of achievement across the whole spectrum of RCA projects and reminded Member States of the need for adequate resources for the national counterparts and coordinators so that they can effectively carry out their important task as the link to the end users of the technologies being transferred.

In recognition of the bilateral and multilateral projects being undertaken by Member States in similar areas of technology both inside and outside of IAEA and RCA programmes, he offered assistance with coordination and suggested that the timetables for RCA activities in future years being generated from Project Formulation and Expert Advisory Group Meetings would assist in the overall planning.

In a final remark he reviewed the current financial situation highlighting problems in Agency and TACF funding. He expressed hope that Member States would increase or begin making extrabudgetary contributions to RCA. He also noted that many of the new project proposals contained in the Background Documents did not have assurances of funding coupled with them and that existing projects would need to be either reduced or terminated to accommodate them.

A full text of the comments is given in Annex 7.

All delegations commented favourably on the detail and layout of the draft Annual Report. Minor editorial errors were to be notified to the RCA Coordinator in writing.

7. Election of Chairpersons of Project Committees

The results of elections were as follows:

a) Medical and Biological Applications of Nuclear Techniques.

Professor Yasuhito Sasaki
Chairman
Department of Radiology
Faculty of Medicine
University of Tokyo

Nominated: Sri Lanka

Seconded: Viet Nam

b) Agricultural Projects

Dr. Nosuo Murata
Director
Eco-Physiology Research Division
Tropical Agriculture Research Center, Tsukuba
Nominated: Pakistan
Seconded : China

c) Nuclear Science and Energy Related Projects

Dr. Eiji Shirai
Director,
Department of Research Reactor
Tokai Research Establishment, JAERI
Nominated: India
Seconded: Republic of Korea

d) Radiation Protection Project

Dr. Sadayoshi Kobayashi
Director,
Safety Analysis unit
National Institute of Radiological Sciences, Chiba
Nominated: Malaysia
Seconded : Thailand

FIRST TECHNICAL SESSION

REGIONAL INDUSTRIAL PROJECT

8. REPORT ON 1991 ACTIVITIES

The RCA Coordinator referred to the draft report for the detailed information on the project. He highlighted a few aspects. A total of 29 regional training activities had been

attended by 393 participants. The final events took place in December 1991 and these marked the end of the UNDP funded activities. It had been anticipated that the total budget of US\$ 3.27 million might have been slightly exceeded but the latest figures pointed to a small underexpenditure.

The results of the National Counterparts Meeting (26-29 November 1991) and the Terminal Tripartite Review Meeting (28 November 1991) were outlined. Of particular note was the information on regional investments in related nuclear technology, communications from Member States showed that there had been more than US\$190 million invested. There was a large proportion, US\$150 million, from private investments. The two biggest technology investments were in the areas of Radiation Technology (US\$117 million) and Nucleonic Control Systems (US\$71 million). All projects had largely achieved their objectives.

The RCA Coordinator also informed the delegates of a recent Joint Inspection Unit (JIU) Questionnaire which had been completed by the RCA Office on the Industrial Project. The information required was readily available from the recently completed Terminal Report and it had been possible to prepare a very comprehensive response. It was possible that the JIU would carry out further work and follow up field inspections were thought to be likely.

The delegates were informed that the Terminal Report draft had now been finalized and was shortly to be distributed to the various UNDP field offices and Headquarters (New York) in accordance with usual UNDP procedures. If there were no objections from UNDP, the report could be distributed to Member States 60 days after UNDP received it.

Australia remarked that the benefits identified from the project would be of great help in the justification of future project support. Sri Lanka detailed the impact of the project activities on NDT, radiation processing, nucleonic control systems and tracer applications in their country, and noted that the biggest impact on regional industries was achieved in countries which had the facilities to provide practical demonstrations and services to industry. Sri Lanka's progress was hampered due to lack of such facilities. Dr. Machi briefed the meeting on the IAEA demonstration facility for the treatment of flue gases which is located in Poland. He also outlined the three demonstration projects currently underway in Japan that were used to remove sulphur dioxide and nitrogen oxides from: coal fired power plant; municipal waste incinerator; and, tunnel gas exhausts.

India detailed its progress and utilization of the four technologies promoted in the Industrial Project: Tracer Technology; Non-Destructive Testing; Radiation Technology; and, Nucleonic Control Systems. Information was given on a Conference currently underway in India, that was dealing with all technological aspects covered in the Industrial Project as well as additional topics. Some 600 participants were attending, half of them from industry.

Pakistan detailed their experience in the project and suggest that the NDT area would require further support. It was announced that the 17th International Nathiagali Summer College on 'Physics and Contemporary Needs' will be held from 25 June to 9 July 1992. Some 300 participants from the Region had participated in the Colleges over the past 16 years. Topics such as Materials Science, High Temperature Superconductors, Nuclear Power Plant Safety, Environmental Pollution and Polymer Chemistry were covered at these previous colleges. The region was invited to attend this event. It was also suggested that other Member States might consider to stage similar events which would provide good fora for the exchange of views. China remarked that 1991 had been a very successful last year. Details were given of the extensive industrial use of the technology particularly in the fields of Radiation Processing and Nucleonic Control Systems.

Republic of Korea announced that Radiation Processing and Radiation Sterilization were technologies that had been picked up by industry. The Radiation Crosslinking of wire and cable was a specific example of a well-used application. Local interest was now being generated for other topics such as process optimization using tracers, flue gas treatment and radiation vulcanization of natural rubber latex.

Thailand stated that the applications all four areas of nuclear technology were being used. The regional activities had created the interest and now industry was receiving the benefits from some techniques. Contacts and collaboration with industry had gone ahead well. The total investment in these technologies in Thailand was assessed to be US\$74 million. Philippines said that the project had been very successful and had created interest in industry. NDT was an area of particular importance. A certification scheme for NDT personnel had been established. An example was cited where these credentials had enabled a Philippine company to carry out work in Singapore. Viet Nam said that in spite of entering into the project at a late stage, it had benefitted from the activities. An example was cited, where a scientific visit to Thailand and Japan on NCS paper had assisted industry to such a degree that 5 months after one NCS system was installed and brought into operation, a second was now required. Japan commented on the success of the project to which they had contributed US\$1.43 million in extra budgetary funds. Research and Development, promotion of technology, and technology transfer had all been important elements of the project, which had very practical applications.

Indonesia expressed its application of the benefits of the project which had archived significant increases in technology capability and shown successful technology transfer. Applications in cross-linking of cable and the use of tracers in enhanced recovery of oil and in steel works were expected to emerge soon as the development of the potential of the technologies continued.

Professor Noramly said that he was delighted with the positive reports which were all very positive indicators of the benefits of the programme and the seriousness with which Member States carried out the UNDP/IAEA Industrial Project. The back-up to this programme, through the Coordinate Research Programme, could also support industrial activities and enhance products and technical capabilities. He went on to comment that the success of RCA is mentioned in many fora and is being looked at by other regions such as Latin America. He described a recent visit to Libya with the Director General where RCA was thoroughly discussed: The successes of RCA could be attributed to the enthusiasm of Member States and their strong desire to acquire new expertise. Now, much of the region's demands can be coped with using regional expertise. He thanked the region's donors, the gifts-in-kind and other additional assistance that had been so valuable in extending resources. He hoped that any printed materials, manuals and the like would be made freely available so that other countries and regions could benefit from the efforts and experience generated during this project.

9. New UNDP/RCA Project Proposal

The RCA Coordinator outlined the outcome of the Meeting of Aid Coordinator (MAC-5) held in Manila 20-21 January 1992, mentioning the strong support provided by many Member States in direct communications to UNDP. The written support provided by the potential donors, Australia and Japan was additional positive evidence of the importance of the proposal.

The positive feed back from UNDP Jakarta following the Terminal Tripartite Review Meeting held in Jakarta 28 November 1991 had also been valuable in providing a high profile and positive image of the achievements of RCA Member States in both phases of the Industrial Project. Comments from the IAEA representative at MAC-5, Mr. E.A Polansky, Deputy Director, Head Programme Coordination Section, concerning the response of UNDP to the project proposal were positive although there was no expectation of a decision before April/May 1992 at the earliest.

A letter from Mr. S.K. Zacharia, Chief, Division for the Regional Programme, Regional Bureau for Asia and the Pacific to Mr. E. A. Polansky (Annex 8) dated 4 March 1992 was distributed to the delegates. This letter contained a copy of a letter from Mr. Zacharia to all the

UNDP Field Offices on the subject of the new project proposal. The RCA Coordinator expressed concern about the content of both letters. Specifically, the decision to refer the proposal back to UNDP Field Offices and respective governments to reascertain their views and continued interest, seemed irrelevant since only a little more than one month had passed since this had been demonstrated at MAC-5.

The RCA Coordinator suggested that there had to be a follow up to the initiatives that UNDP had signaled in their recent correspondence with IAEA. Mr. Noramly said that a joint statement from the Working Group Meeting as well as individual country interventions would be necessary. He further explained that since the past project could now be demonstrated to be so successful, the various missions in New York needed to be informed by both the developing and the developed countries.

The Philippines said that UNDP Manila had received the letter from UNDP Headquarters. Concern was expressed by Australia at the evasive attitude implicit in the letter. They also wished to register that the cover letter was inaccurate in describing Australia's contribution as US\$1.5 million and also in the statement that these funds could be used to provide bridging between the old Industrial Project and the new programme. Japan supported this view and emphasised that it had not yet made a judgment on the specific amount for future contributions. The assignment of US\$1 million was not in line with Japanese government policy.

There was discussion on the possibility and desirability of revising the new project proposal in line with the two objective format suggested in the UNDP letter. The consensus view was that such modification would not be justified especially taking into account the extensive work that had gone into formulating and preparing the proposal based on Member States' priorities and needs. It was agreed that the Project Formulation Framework as submitted to UNDP should stand.

10. Bridging activities for 1992

The RCA Coordinator directed Member States' attention to the bridging programme of activities listed in Annex 9 and reminded them that this programme had evolved from the slippage of project activities from 1991. The bridging was therefore being achieved at no additional cost to the donors, as agreed previously. Additional details on expert names, dates and venues were to be submitted later to the RCA Coordinator.

11. New Project Proposal from Australia

The RCA Coordinator remarked that the New Project Proposal from Australia on the Applications of Isotope and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine had been circulated to all developing Member States and feedback had been received from them all. There was unanimous support for the project.

Australia mentioned that this project was designed to mesh in and complement the new project proposal currently before UNDP. Because of expected delays in the start-up of this project discussed earlier, these might be some small elements that might not be optimally matched in the initial stages but it should not be present a problem. It was also emphasized that the Australian contribution would not be paid in a single block but would be paid in phases through the life of the project.

Japan welcomes the new project proposal and hoped it would be possible to coordinate the radiation protection components associated with the industrial applications projects into the radiation protection infrastructure project formulation meeting being held in June 1992. It was mentioned that there was expertise in Japan in the area of Nuclear Medicine that could contribute to the aspects of the proposal dealing with such topics as education and handling of materials. It was hoped that there would be scope for collaboration in this area. Australia welcomed the Japanese comment and hoped this could be achieved. The request would be taken back to Australia.

Mr. Noramly inquired whether it would be possible for Mongolia to take part in this work even though they had not yet joined RCA. Australia said it would welcome Mongolian participation in the projects it funds.

There was a general reaffirmation of strong support for the project proposal by all the delegates.

12. Concluding Remarks by Chairman

The Chairman summarized the session's discussion. He noted the meeting's approval of and the adoption of the 1992 Bridging Programme and the new project proposal from Australia. He declared the session closed.

SECOND TECHNICAL SESSION

MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES

13. Constitution of the Project Committee

The Project Committee was constituted with Professor Yasuhito Sasaki in the Chair.

14. Technical Co-operation Projects

The Chairman invited the RCA Coordinator to describe the three projects implemented under this category (Annexes 10, 11 and 12) and then the subject were open to discussion.

Almost all participants commented on each of the three TC projects reporting their participation, evaluation of the effects and outcome of the projects.

14.1 Radioimmunoassay of Thyroid Related Hormones (Annex 10)

The technology of radioimmunoassay (RIA) and Immunoradiometric assay (IRMA) for the measurement of thyroid hormones and thyroid stimulating hormone (TSH) have been widely used for diagnosis of thyroid diseases and evaluation of thyroidal function after therapy. The methods of internal quality control (IQC), external quality assessment scheme (EQAS), as well as computer assisted data processing (DP) were widely practiced and their importance was greatly appreciated by RCA Member States. The impact of this project can be assessed as significant especially because of the large decrease in cost/patient test from US\$2.50 to 10-20c and the establishment of sustainable regional capability for production of many of the reagents. There were requests for the continuation of the project by Sri Lanka, Indonesia and Viet Nam so that the project teams could remain as effective units. It was mentioned by the RCA Coordinator that most teams involved in this project would have strong links with the IAEA project on radioimmunoassay for Hepatitis B diagnosis and this could provide the required backstopping.

14.2 Radioimmunoassay for Hepatitis B diagnosis (Annex 11)

The RCA Coordinator remarked that this project had only just commenced and the equipment and reagent supplies were just being organized. It needs to be noted that the reagents and the equipment (bead washers and handling equipment) were being supplied by a developing country in the region, namely China. Since there were well-defined linkages with the RIA thyroid project, it was expected that there would be strong progress.

Many delegates commented on the importance of the technology in the overall context of controlling the spread of Hepatitis B infection.

14.3 Radiation Sterilization of Biological Tissue Grafts (Annex 12)

As reported by the delegates, the extent of utilization of this technology differed from country to country. Indonesia reported up to 8000 treated cases a year while Philippines reported that it will be looking at the possible commercialization of tissue graft service.

The RCA Coordinator reported that there would be a Project Formulation Meeting for this project in Manila, Philippines from 3-7 August 1992. This meeting would set the programme for the next 5 years.

15. Co-ordinated Research Programme (CRP)

15.1 Imaging Procedures for the Diagnosis of Liver Diseases Phase II (Annex 13)

The Chairman invited Dr. Tateno, the expert in charge of this programme, to report on the present status and intermediate results of the programme. Dr. Tateno distributed a document which contained numbers of liver scintigrams and ultrasonograms collected and the results of ROC (receiver operating characteristics) analysis of the interpretation of the images by participating specialists. Dr. Tateno explained the document showing that ultrasonograms are superior to scintigrams in detecting intrahepatic mass lesions, whereas scintigraphy seems superior to ultrasonography in diagnosing liver cirrhosis. The programme is scheduled to be completed by January 1993 and may enter into 3rd phase thereafter. Several questions related to the interpretation of data in Dr. Tateno's report were asked and comments were made, specially those related to the ability of the individual physicians to interpret the data.

15.2 Improvement of Cancer Therapy Phase II

Dr. Sakata, the expert conducting this project, briefly reported that training on uterine cervix radiotherapy had taken place in Member States. Comments were made by participants in regards to number of patients they treated and results of the follow-up studies. The need for acquiring more instruments was indicated. Dr. Sugawara, expert in radiotherapy, commented on the importance of the research on radiosensitization and distributed a document announcing '8th International Conference on Chemical Modifiers of Cancer Treatment' to be

held from June 21 to 25, 1993 in Kyoto, Japan. Dr. Sugawara also mentioned the usefulness of hyperthermia in cancer treatment stating that an effort is being made to develop an inexpensive instrument for this purpose. The importance of chemical modifiers was stressed by some of the participants and funding to support attendance from developing countries was requested.

Dr. Sakata said that the software being developed for computer assisted planning and dosimetry in radiotherapy of carcinoma of the cervix should be available and distributed this year. Experts would be able to assist in demonstrating its use.

15.3 Radioaerosol Imaging for the Diagnosis of Respiratory Diseases (Annex 14)

India explained that this CRP was making use of equipment and techniques they had developed. Although the project was originally designed to be completed in 1991, a 1 year extension has been agreed so that the effect of air pollution can be studied.

Some participants made comments on their experiences of inhalation lung scintigraphy. The numbers of the studies are still limited to 10 to 40 subjects, including normal and patients with lung diseases in each country. The importance of the examination for the assessment of the effect of air pollution was stressed. Some technical difficulties accompanied with aerosol formation were pointed out. The Chairman mentioned the recent development of the new 'Technegas' producing instrument invented in Australia which makes it much easier to form small aerosols and so produces good quality images. The device has been commercialized and many countries have now used it for lung scintigraphy.

16. Projects with TC and CRP Components

16.1 Nuclear Instrument Maintenance (Annex 15)

Australia reported on the Project Formulation Meeting for this project which was held in Sydney 24-28 February 1992. Eighteen participants from 12 RCA Member States attended. The meeting reviewed the current progress of the project. It was also reported that Australia had made available additional funds to support a third course on the "Use of Computers in Nuclear Medicine", which is being held in Sydney 9-27 March 1992. It was stated that the Nuclear Medicine initiative, currently part of the Australian new project proposal, was concerned with the certification of Medical Technologists which would ultimately achieve more optimal use of facilities.

The RCA Coordinator reported that the Meeting had reviewed the progress and achievements of the first phase of the project and then considered the possible needs and direction for a second phase. Discussions centered on the following areas:

- * Nuclear Instrument Maintenance
- * Computerized Management of Preventive Maintenance
- * Quality Control, including, preventative maintenance of nuclear medicine instruments
- * Repair and Spare parts supply
- * Upgrading, refurbishing and provisions of second hand gamma cameras
- * Information exchange, and
- * Conversion of analogue gamma cameras to digital operation using PC's.

The report was completed at the beginning of March 1992. Proposals were made on all topics except second hand gamma cameras.

A number of delegates commented on the importance of spare parts services, as maintenance and repair of the nuclear medicine instruments have often been difficult. The importance of up-grading instruments was stated and it was suggested that 'maintenance' should include not only 'repair' but also 'upgrading'. The rapid increase in the numbers of Scintillation cameras in Korea and SPECT systems in Japan in the recent years was reported. The idea of donation of second-hand scintillation cameras was welcomed by some delegates. Some experiences of successful use of second-hand cameras were presented. At the same time several difficult problems concerning the donation of the instruments were outlined; cost of tuning the instrument; customs charges; guarantee; spare parts; etc. In addition, the question of responsibility for the donated instruments had to be solved before the implementation of the project. Dr. Machi expressed IAEA's interest in this project.

17. New Project Proposals

The RCA Coordinator informed the delegates that new project proposals associated with the Nuclear Instrument Maintenance Project had been incorporated in the report. He informed them that a Regional footnote a project with the same title had been funded by Germany previously but now the IAEA had been informed that no funds would be forthcoming even though events had been planned and commitments made for training courses.

The Project Formulation Meeting had also absorbed the objectives of this project in the new project proposal.

Professor Noramly expressed satisfaction with the projects being undertaken in this field. He was especially pleased with the achievements in RIA thyroid hormones and how well it had achieved its objectives. Since AFRA was now beginning a project on RIA for its 13 Member States, it would be useful to have an opportunity made available for them to benefit from this region's experience. France was providing limited financial assistance but this would not be sufficient. He expressed an opinion with regard to the proposal on second hand gamma cameras. He also mentioned that he had been informed by an Agency Technical Officer that a US firm now undertaken refurbishing gamma cameras and will guarantee them. Further investigation of this were thought to be useful.

18. Concluding comments by Chairman

The Chairman summarized the discussions of the session and then expressed his sincere gratitude for the cooperation of all the participants who had led the discussions to the constructive and fruitful outcome.

THIRD TECHNICAL SESSION AGRICULTURAL PROJECTS

19. Constitution of the Project Committee

The Project committee was constituted with Dr. Murata in the Chair. The text of his introduction remarks is given in Annex 16.

20. Technical Cooperation Project and CRP Components

20.1 Food Irradiation Process Control and Acceptance (RPFI III) (Annex 17)

Viet Nam, Malaysia, China, Sri Lanka, Indonesia, Pakistan, Philippines, Republic of Korea, India, and Thailand all reported positive achievements in this Project. Progress in one or more aspects such as the number of approved irradiated food, preparation of legislation and regulation and consumer acceptance were reported by them. It was of interest to note that in China, a large scale irradiated food (40,000 t) have been served to the market, and off-season marketing of irradiated agricultural product benefits farmers very much. Now irradiation of spices, onions and garlic is practiced in many countries. Public acceptance is a major problem in Korea and Japan but in many other countries the situation is improving.

Pakistan suggested that the establishment of commercial demonstration irradiator might be considered and Sri Lanka commented that the absence of an irradiator was hampering their programme, adding that the provision of a unit from IAEA under the TC programme should be considered.

Dr. Machi reported that a recently opened food irradiation facility in USA had been undertaking a marketing study on strawberries. It was found that the irradiated fruit, which was also clearly marked as being irradiated, sold very well in spite of being more expensive (5%) than the non-irradiated fruit.

20.2 Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen. (Annex 18)

Pakistan announced the opening of a new National Institute for Biotechnology and Genetic Engineering at Faisalabad in January 1992. Member States were informed that training could be obtained there through TCDC.

China announced that it would be hosting the Research Coordination Meeting for the CRP in 1992. Indonesia announced they would like to join this project. Philippines and Viet Nam reported good progress with this project. The Philippines mentioned the importance of studies of rhizobia and biological nitrogen fixation in acidic and other adverse soils was emphasized.

Pakistan suggested studies of ecology of rhizobia and soil micro-flora using biotechnological tools as an important area to be dealt with in future.

21. New Project Proposals

21.1 Use of the Sterile Insect Technique to Protect Fruit and Vegetables from Destruction by Tropical Fruit Flies. (Annex 19)

Strong interests were expressed by many countries, including Thailand, Philippines, Pakistan and Sri Lanka. Thailand and Philippines announced that they were undertaking small scale on-going studies. The problem of incorporating this project into the RCA activities because of the necessity to keep the budgets at the present level was mentioned by the RCA Coordinator and Australia. Japan expressed its interest in co-operating and contributing 'in kind' to research and development in this field.

Sri Lanka suggested a project on mosquitos using SIT.

Professor Noramly described some successful examples of the large scale application of this technique which showed a very rapid pay back of the initial investment.

In spite of the strong interest in the general topic, there was no substantial discussion on the detail of the proposal. Member States were requested to send detailed comments to the RCA Coordinator and these will be referred to the 1992 RCA General Conference Meeting.

21.2 Amelioration of Environmental Pollution by F-1 Sterility for Controlling Caterpillar Tests of Horticultural and Field Crops (Annex 20).

The technical merit of the project was acknowledged by Australia and India but the substantial resources requested to fund the project were seen to be a discouraging factor, giving a lower priority. Some small scale project work was reported by Indonesia, and Pakistan. Sri Lanka inquired whether a modified proposal could be comfortably absorbed into the limited RCA budget, and suggested that the feasibility of embarking on a project for control of Malaria and Filaria mosquito be also examined as these are serious problems in the region. India and the Philippines expressed interest in this proposal. Member States were requested to send their comments on the details of the proposal to the RCA Coordinator so that it can be considered at the next RCA General Conference Meeting in 1992.

21.3 Regional Technical Cooperation Project to Develop Strategies for Improving Animal Production and Health in Asia. (Annex 21)

A number of Member States pointed out that the proposal had no specific aims and objectives. Both Sri Lanka and Viet Nam thought that such a proposal, if objectives were clearly defined, could be useful in maintaining project momentum since the previous projects in this field have been completed. Sri Lanka suggested that the proposal be reformulated.

Professor Noramly told Member States that they must assign priorities to projects, the function of the IAEA being only that of a secretariat. He said that there are many projects that have been completed and the information on findings, experience, etc are reported and these articles are readily available to Member States. He suggested that if Pakistan wishes to propose that a demonstration irradiator be purchased under bilateral TC programme, it could be considered.

22. Concluding Comments

The Chairman invited comments from Dr. T. Hayashi, Chief of Radiation Technology Laboratory, National Food Research Institute, Ministry of Agriculture, Forestry and Fisheries. He then went on to sum up session's discussions. He said that the maintenance of facilities was important and that there had been suggestions for commercial demonstration facilities. Future activities needed to be considered with due regard to financial constraints. The details of the new project proposals needed to be carefully studied and proposals made if appropriate.

FOURTH TECHNICAL SESSION

RESEARCH REACTOR, ENERGY BASED AND GENERAL PROJECTS

23. Constitution of the Project Committee

The Project Committee was constituted with Dr. Eiji Shirai in the Chair.

24. Research Reactor Technical Cooperation Project

24.1 Research Reactor Utilization (Annex 22)

Indonesia reported that two regional training courses had been held in 1991, one in Bandung on the "Use of Personal Computers in Research Reactor Operation and Management", the other in Serpong on "Computer Application on Research Reactor Control and Calculation". This latter course received US \$10,000 finance from the Indonesian Government. Republic of Korea stated its desire to continue to participate in this project. Pakistan gave details of P/C system developed at PINSTECH for monitoring dose levels in reactor hall process channels. It was also mentioned that emphasis in this project should be given to Materials Studies such as material stress and texture problems. This would be an additional activity rather than a new project. There was general support for training in computer applications to research reactors.

25. Energy Based Technical Cooperation Projects.

25.1 Pre-Project Activities and Manpower Development Nuclear Power Plant Project Planning (KAERI) Training Course (Annex 23)

Republic of Korea announced it would be supporting a new Regional Training Course on NDT and Evaluation in Nuclear Power Plants in October. The draft prospectus was being distributed. Thailand, Malaysia, China, Pakistan, Viet Nam and Indonesia all asked for

further courses in the area of Nuclear Power Planning. The research reactor interests of Thailand and China were emphasized. Pakistan announced that a Regional Training Course on "Power System Expansion Planning" would take place in Lahore 26 April to 4 June. Support was voiced for these types of courses.

26. New Project Proposals

The RCA Coordinator informed the Meeting that one of the new project proposals had been referred back after being tabled at the 1992 General Conference Meeting. This was "Nuclear Techniques in Development of Advanced Ceramic Technologies" (Annex 24). The other was a proposal on Accelerator Based Technologies (Annex 25).

With regard to the first proposal, India welcomed the proposal and wanted to participate. Further they offered to hold a school on neutron scattering applications in 1993 using their extra-budgetary funds set aside for RCA. Topics could include residual strain measurement and chemical applications like, study of reactions in material, like cement, metallurgical applications, etc. Support for the project came from Malaysia, Indonesia and Pakistan. Sri Lanka said that although they did not have a research reactor, they would like to see such a programme operating at one or more centres of excellence where fellows can be trained and carry out R & D on topics of specific development interest to Sri Lanka. India mentioned that this type of arrangement had occurred in the 1960's when the India-Philippines Agency Agreement was in force.

Dr. Machi noted that the Materials Science component in the Australian new project proposal and suggested that some links might be forged there. There was also a possibility for Japanese involvement.

The second proposal on Accelerator based technologies was considered to be too wide in scope by many Member States and further definition of the project would produce a proposal that could be more readily evaluated in terms of utility, relevance and cost benefit. Sri Lanka inquired whether the Material Science component in the Australian proposal could encompass some component to allow identification and evaluation of the potential of such techniques in individual countries in the region. Australia said these comments were useful and would refer them back to the appropriate agency.

Professor Noramly reminded delegates that 12 of the 14 RCA Member States have research reactors (some more than one). There appeared to be the potential for ample cooperation. It was his view that there was still underutilization and under-maximization of a number of these plants. Six of the 14 RCA Member States have or have planned Nuclear Power Plants for the near future. The question of public acceptance is being actively tackled by the IAEA. He expressed the view that RCA should be going for new technologies. Agricultural projects were more suited to bilateral funding whereas the work on ceramics or accelerators needed encouraging. Meetings should be arranged to set priorities and look at outputs so that by September, at the RCA General Conference Meeting, there will still be an opportunity for organization of an appropriate project.

27. Concluding comments by Chairman

The Chairman reviewed that the session noted the consensus of agreement on materials science applications and also the need for the new accelerators proposal to be more tightly reviewed.

**FIFTH TECHNICAL SESSION
RADIATION PROTECTION PROJECTS**

28. Constitution of Project Committee

The Project Committee was constituted with Dr. Sadayoshi Kobayashi in the Chair. The text of his opening remarks is given in Annex 26.

29. Technical Cooperation Project

29.1 Radiation Protection Infrastructures (Annex 27)

Australia reported on the results of a Workshop on the "Development of Training Techniques and Method of Instruction in Radiation Protection", held on 17-28, Feb. 1992 in Sydney, Australia. It was attended by 14 participants from 12 countries and provided a unique opportunity for the Member States' specialist trainers of radiation protection to review the development of instruction methods and techniques which may be utilized in their training programme.

It was indicated by Australia that manuals as well as any other useful tools for training and instruction developed by Australia would be made available for use by Member States upon request.

India reported on the results of Training Course on "Safety Aspects of Industrial Application of Radiation Sources" held on 2 - 13 December 1991 in Bombay. It was attended by 16 participants from 9 Member States. Participants were acquainted with the radiation protection and safety aspects in industrial applications of radiation sources through reviews and exercise of standard practices and new developments in the preparation, use and disposal of industrial radiation sources.

China reported on the results of Training Course on the "Environmental Monitoring Related to the Assessment of Nuclear Facilities" held on 14-25, October 1991 in Taiyuan. It was attended by 8 participants from 6 Member States. The course was aimed at acquainting the participants with the theory and practical applications of environmental monitoring for nuclear facilities including routine and emergency situations. The related national training program activities were also detailed.

Dr. Sakurai reported on the results of the training course on the "Basic Techniques of Radiation Protection" held on 14-25 October 1991 in Tokai, Japan. It was attended by 12 participants from 10 Member States and provided the participants with the fundamentals of theory and techniques for measurements, calibration, maintenance and radiation control systems in nuclear and radiation facilities.

Sri Lanka said that high national priority was given to Radiation Protection for the next few years. A National project to revise and update national regulations was underway. Courses for participants from the medical profession were being conducted but it was proving difficult to attract the doctors. Problems of cost were being experienced with the change over from film badge to TLD systems and any assistance to obtain cheaper dosimeters would be appreciated. The food monitoring programme had been concluded in 1987 but there was a desire to keep a skeleton programme going with random testing to maintain skills levels. Information was sought on what levels were currently being detected and to the reasons why some countries chose standards that were lower than FAO or WHO.

Philippines expressed willingness to participate in the forthcoming Project Formulation Meeting and fully participate in the project.

Pakistan explained about the regulatory aspects of nuclear application in the country, i.e., ordinance and regulations which apply also to medical uses of radioisotopes and X-rays.

Malaysia reported on the overall status of activity in radiation protection such as those on personal dosimeter intercomparison, radioactive contamination of food, and related national and regional training courses.

Viet Nam reported on the progress made in establishing legal basis for radiation protection in the country. Certain difficulties were being experienced in achieving proper calibration of dosimetry in low energy range due to insufficient instrumentation.

29.2 Personal Dosimetry (Annex 28)

Dr. Minami explained the overall results of intercomparison exercises on the personal dosimeter and the reference calibration facilities of participating Member States. It was noted that significant upgrading was achieved for personal dosimetry systems since the start of the program.

An explanation was made on the final phase activity on Personal Dosimeter Intercomparison program during 1992 as well as on the Workshop on Personal Dosimetry to be held in Tokai, 26-30 Oct. 1992 where overall intercomparison results will be analyzed and discussed.

Some delegates asked for clarification of the performance of the personal dosimeter in their countries as assessed by the intercomparison exercise. Questions were also raised as to the definition of "Infrastructure", which was answered by the RCA Coordinator to have a meaning in conformity with its usage in the Report of 1991 Expert Advisory Group Meeting.

30. Coordinated Research Programme (CRP)

30.1 Reference Asian Man (Annex 29)

Dr. Kawamura explained the scope and objectives, progress made so far, as well as the expected achievements of the Coordinated Research Programme on the Complication of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man, which started in 1989 and scheduled to end in 1993. A Research Coordination Meeting was convened in India on April 8-12, 1992, which was attended by representative experts from Bangladesh, China, India, Indonesia, Japan, Malaysia, Philippines, ICRP and IAEA. An expert group meeting is planned to be held in Japan this year, and the final coordination meeting in 1993.

Publication of the results is planned, which will serve as a fundamental reference in setting various parameters to be used in designing protection measures. India supplemented information that Indian activity in this program includes collection and analysis of trace elements of biological importance.

31. New Proposals

Three subjects were proposed from IAEA Technical Officers as possible new projects, namely:

- (1) Survey and control of Exposures in High Natural Background Radiation Areas (Annex 30)
- (2) Radon Exposures in Occupational Work other than in Uranium Mining, (Annex 31) and
- (3) Training in Radiation Protection in the Mining and Milling of Radiative Ores (Annex 32)

Regarding the first subject, experiences were reported by China and India on the dosimetric and epidemiological survey in the natural high background radiation areas in China and in India, respectively. In both surveys no significant adverse health effects were noted.

All the delegates indicated their interest and support in this subject as well as the second subject on occupational radon exposure problems. Pakistan indicated it could provide help to RCA Member States. The third subject also drew interest from most of the delegates and it was noted with pleasure by the Meeting that the training course on this subject could be hosted by Australia in 1992.

It was emphasized by Japan that the planned Project Formulation Meeting for Radiation Protection Project Phase II, to be held in June in Tokai this year, would be the most appropriate occasion for discussion of new proposals including the three subjects discussed presently, as well as those listed in the Report of 1991 Expert Advisory Group Meeting, and that cooperation is requested from all the Member States to facilitate the participation of their expert to this Meeting.

Professor Noramly, after reviewing the major discussion of the session, assured the continued support by the Agency for the Radiation Protection Project, since the Radiation

Protection Infrastructure constituted the essential basis to facilitate any utilization of nuclear techniques. He also explained the policy of the Agency that technical assistance programme to a Member State will not be approved unless the country in question established an infrastructure for radiation protection.

32. Concluding Remarks by Chairman

In his summing-up of the session the Chairman of the Session asked the delegates to kindly refer to the conclusions and recommendations listed in the Report of 1991 Expert Advisory Group Meeting. He concluded the Session by acknowledging the strong support and interest of the delegates in the Radiation Protection Project as was shown in the stimulating discussions, and expressing his thanks for the cooperation and assistance of the delegates and RCA Coordinator.

COUNTRY STATEMENTS

33. Receipt of Country Statements

The RCA Coordinator reminded delegates that it had become standard practice to submit the country statements in written form and only make comments if there were urgent matters to be brought to the attention of the Meeting. He asked delegates if they were agreeable to continue in this manner. There was no disagreement.

SECOND ADMINISTRATIVE SESSION

34. Renewal of RCA Agreement

The Chairman reviewed the decisions made by the Member States at the 1991 Working Group Meeting and the 1991 General Conference Meeting that no changes of the 1987 Agreement were warranted and that an extension agreement be used as had been done previously. The RCA Coordinator referred to the Background Documents where one possible version of such a document was tabled for discussion.

Japan expressed the opinion that the most appropriate means of achieving the extension was through the use of a two article agreement similar to that used in 1977 and 1982. It was further stated that there were strong parallels because in 1977 and 1982 there were no alterations to the 1972 agreement articles and it was only in 1987 that the agreement had a major revision. In the 1992 renewal there would be no alteration of the 1987 agreement

articles and thus it was clearly appropriate to use the same two articles form of extension agreement used in 1977 and 1982. The precedents had been set and they should be used. The mother agreement of 1972 had been replaced by a mother agreement of 1987 and extension for 1992 was for the 1987 agreement and not the 1972 agreement.

A draft two article agreement was circulated to the delegates for consideration. There was a full discussion on the proposal. Because of the need to have advice on the legal aspects of the wording and the detail of the draft, the Chairman referred the matter to the IAEA Secretariat, requesting them to seek urgent advice from the IAEA Legal Department. Professor Noramly said that it should be possible to have an opinion on this rapidly and the Secretariat would advise Member States on the outcome.

It was noted that all Member States had a strong desire for the RCA to be extended for 1992 to 1997 and that according to the Articles at least two Member States had to notify the Director General, IAEA of their willingness to extend before the 11 June 1992 deadline.

The Second Administrative Session was resumed on the afternoon of Friday 27 March. The Chairman, Mr. Yoshiyuki Sadaoka, was unable to continue with this session because of urgent government business. The Meeting unanimously agreed to his place being taken by Dr. Sadayoshi Kobayashi, who had also been Chairman of the Fifth Technical Session.

35. RCA Action Plan for 1992

The RCA Co-ordinator referred to the materials in the background papers (Annex 45) and elaborated the purpose of the Project Formulation Meetings for the Nuclear Instrument Maintenance, Radiation Protection and Radiation Sterilization of Tissue Graft projects. He also foreshadowed the cessation of the CRP's on Imaging Procedures for Diagnosis of Liver Diseases and Radioaerosol Imaging for Diagnosis Respiratory Diseases. Australia noted the change of the project on Use of Computers in Technetium -99m Imaging from 1991 to 1992. Japan accepted the plan as outlined and offered to support technically and financially as much as possible. Japan hoped to be involved with Member States in implementing of the programme and in the maximization of co-operation to the greatest extent possible.

The meeting approved the Action Plan for 1992.

36. RCA Cost Projections for 1992

The RCA Coordinator pointed out that there were some uncertainties regarding the possible budget for 1992 (Annex 46). This largely stemmed from the vague timetable associated with the new project proposal before UNDP. Because of this and the strong indications that even when or if approved, it would be unlikely that any significant level of project implementation could be achieved in 1992, no funding was anticipated for 1992.

There was a general discussion on specific issues associated with the budget. On the issue of Regional and RCA projects, Sri Lanka suggested that RCA should set the priorities for both since they represented the majority of the region. This would ensure that priorities were set regionally rather than by the IAEA Technical Officers. The Chairman noted the comment.

The RCA Budget for 1992 was approved.

37. Other business

The Chairman introduced two items for discussion which were supported by documentation circulated at the meeting. The first item was a new project proposal for Advanced Brachytherapy for Cancer of the Cervix (Annex 47).

The RCA Coordinator mentioned that this had been tabled at the RCA Steering Committee Meeting. Dr. Machi confirmed that financial support for this project had not yet been secured. He emphasized both the importance of this work to the region and the shortage of suitable equipment. Pakistan, Philippines and Sri Lanka expressed their support and interest.

In answer to questions on the costs of equipment Professor Noramly confirmed that each unit cost around US\$200,000. Japan noted the comments of the delegations and Dr. Machi.

The second item was the draft letter for transmission to UNDP, which was requested by Member States during the First Administrative Session. The text of the draft was accepted after minor alterations (Annex 48). It was agreed that each Member State would respond individually to UNDP Field Offices when they were approached as their follow-up action to Mr. Zacharia's letter and it was not necessary for each UNDP Field Office to receive a copy of this letter from the Working Group Meeting.

It was also reaffirmed that the current PFF would not be rewritten to bring it into line with UNDP comments since the current document was agreed statement of Member States needs and priorities.

In other business Pakistan drew the meeting's attention to the 19th Consultative Meeting of INIS Liaison Officers held in Vienna 21-24 May 1991 in which the possibility of evolving a framework for regional co-operation among Member States of Asia and Pacific Region in the field of information exchange, on the pattern of ARCAL user information, was discussed. The main proposal emerging from this Meeting involved having arrangements with INIS centres in the region so that they could share experience as well as literature. Pakistan proposed that such a project on nuclear information should form part of the RCA programme. India supported this proposal and referred to its statement at the previous RCA General Conference Meeting regarding the need for such a project within the framework of RCA. An early response to this request for support was requested. Professor Noramly referred to the INIS programmes in ARCAL and AFRA. He expressed an opinion that such programmes were good and should be encouraged by the Agency. There was general support for the initiative and the Chairman asked the Secretariat to consider the comments as a concrete proposal for the future RCA programme.

The Chairman invited Mongolia to address the Meeting. Mongolia expressed thanks at being able to attend the Working Group Meeting and said that they would be joining RCA as soon as possible. Gratitude was also expressed to the Japanese Government and Authorities for their assistance and co-operation. Mongolia had been an IAEA Member State since 1974 and currently had 12 on-going Technical Co-operation projects many with similar objectives to the RCA programme. Participation in RCA was seen as a valuable means of advancing the country's technology.

Professor Noramly said that there was a general view supporting Mongolia joining RCA. He asked Member States to open their doors to them so their scientists could view the benefits of RCA membership. He mentioned that Japan and China were co-operating to allow them to see their facilities .

The Chairman summarized the session referring to the acceptance of the RCA Action Plan for 1992, the 1992 budget and the agreed letter to be sent to UNDP. He mentioned the proposal for the information exchange project based on the INIS discussions and the CRP for Advanced Brachytherapy for Cancer of the Cervix. The participation of Mongolia as an observer was noted.

The Philippines announced that they would like to host the next RCA Working Group Meeting in Manila in 1993.

CLOSING SESSION

38. Acceptance of Draft Documents.

The draft report was distributed to delegates and reviewed on a page by page basis. There was a request for further consideration of the text and it was decided that further corrections could be notified to the RCA Office up until 1 May 1992.

39. Closing Remarks by IAEA

Professor Noramly expressed his thanks to the Chairman, Dr. Kobayashi, for the successful conclusion of the meeting. He asked Dr. Kobayashi to convey his appreciation to Mr. Sadaoka for his Chairmanship. Thanks were expressed to the Japanese Government, the Session Chairman and the 'behind the scenes' staff for their efforts as well as Dr. Sato and the staff of the JAERI Takasaki Radiation Chemistry Research Establishment who had made the field trip such a success. The facilities at Takasaki were noted as being impressive and had been used by many RCA fellows.

Professor Noramly said that the 1978 RCA Meeting held in Kuala Lumpur had been especially significant in plotting the future programme. The first official Working Group Meeting in the region had then taken place in Tokyo in 1978. He said that it had been a very positive experience for him to have been able to follow the programme from its inception. He thanked the generosity of the donors and the 'in kind' contributors for maintaining the viability of the RCA programme. He emphasized that RCA had been a true regional programme. In spite of superficial differences in language, economies, cultural traditions, etc it had been possible to achieve strong regional co-operation and achievements. RCA had been a passport for many regional scientists enabling them to become familiar with a wide range of nuclear technologies.

In concluding, he remarked that he was pleased to note that the Philippines had offered to host the next RCA Working Group Meeting and this was another sign of the well-established nature of the RCA. Finally he thanked the Chairman for his expertise in dealing with a difficult session and keeping matters to time.

Malaysia noted that this would be the last RCA Working Group Meeting that Professor Noramly would attend as DDG-TC and expressed appreciation of his concern and efforts in support of RCA over the past six years. These sentiments were echoed by the other delegations.

40. Official Closing

The Chairman reviewed the deliberations of the Meeting over the four days and outlined the decisions that had been made. He thanked delegates for their co-operation in achieving a successful conclusion to the meeting and looked forward to a fruitful year. He expressed thanks and appreciation for the support and efforts of Professor Noramly for RCA over the past 6 years. He closed the meeting wishing all participant a safe journey home and hoping that they had a rewarding visit to Japan. A full text is given in Annex 49.

The 14th RCA Working Group Meeting

24-27 March 1992, Tokyo

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The 14th RCA Working Group Meeting
Welcome Address by Hiroto Ishida
Director-General
Atomic Energy Bureau
Science and Technology Agency
(Tokyo, 24-27 March 1992)

Good morning Ladies and Gentlemen

It is my greatest pleasure as a representative of our government to give an address to the distinguished delegations of the 14th RCA Working Group Meeting.

This is the second time the meeting has been held in Japan. The first meeting in Japan was held in 1979, one year after Japan first participated in RCA. Today we have here representatives of RCA member countries and two representatives from Mongolia as observers, and I would like to say welcome to all of you.

(The International Situation and Energy Circumstances)

The international situation to the 21st century is changing rapidly, with for example, the outbreak of the Gulf War last year. The disorganization of the Soviet Union, and the progress in the nuclear disarmament negotiations between the U.S. and the former Soviet Union. A new order will be established.

Due to the Gulf crisis, though there was no serious economic dislocation, we gained a new appreciation of the important need to secure a stable energy supply for our country whose energy structure is fragile. From the international point of view, it resulted in arousing public awareness of the fear of the proliferation of nuclear weapons, and the importance to further strengthen the non-proliferation system of nuclear arms was recognized. As a strict promoter of the peaceful utilization of nuclear energy, our country will contribute to international effort for keeping the non-proliferation system of nuclear weapons.

Problems of environmental preservation on the global scale, such as global warming according to green house effect and acid rain, have also recently been recognized.

(Basic Position Regarding International Co-operation)

From the basic position of our country regarding international co-operation in the field of nuclear energy, we think it is important to contribute positively to the international society, and international contribution is one of the basic objectives in developing and utilizing nuclear energy. In particular, many Asian countries which have been rapidly growing, want to promote the development and use of nuclear energy. I think mutual co-operation in nuclear related fields in the Asian district including our country will become increasingly important in the future.

(Co-operation in RCA)

As described in Article 1 of the RCA Agreement, by mutual co-operation of government parties and the Agency, co-operation in RCA aims promote and co-ordinate co-operative research, development training projects in nuclear science and technology through their appropriate national institutions. Twenty years have passed since the creation of RCA, and nuclear science and technology have made remarkable developments during this period. I think it is important for people to properly share this development, and it is very gratifying that this will be achieved under the framework of RCA.

The Science and Technology Agency has co-operated in and supported the Regional Industrial Project, the Medical and Biological Applications of Nuclear Techniques, and the Radiation Protection Project, in co-operation with the Ministry of Foreign Affairs and related ministries and agencies, and authorities related to the Science and Technology Agency such as JAERI and PNC.

The results of these projects have been evaluated highly and further co-operation and support will be given in the future.

The current RCA Agreement expires in June this year, but I have heard that it will be extended for five years. I would like to finish my address, hoping that future RCA co-operation activities will be as fruitful in the next stage and contribute to the further development of nuclear science and technology of RCA member countries.

Thank you very much.

**FOURTEENTH RCA WORKING GROUP MEETING
TOKYO, JAPAN
24-27 MARCH 1992**

ADDRESS OF WELCOME

BY

**Noramlly bin Muslim
Deputy Director General
Head of the Department of Technical Co-operation
International Atomic Energy Agency, Vienna, Austria**

Distinguished Delegates, Colleagues both from Member States & IAEA, Ladies and Gentlemen.

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

The Agency is privileged and honoured to have the Director General for Scientific and Technological Affairs, Ministry of Foreign Affairs, H.E. Mr. Takaya Suto Director General for Scientific and Technical Affairs, open this Fourteenth Working Group Meeting of RCA Member States. The IAEA presents its compliments to the Government of Japan and expresses its gratitude to it for agreeing to host this Working Group Meeting. Japan has made a very significant contribution to RCA over the past decade, providing substantial technical and financial resources that have sustained a variety of technical projects and enabled us to maintain the wide spectrum of technology being presented to Member States from Regional resources. Since this will be the last RCA Working Group Meeting, I will attend as Deputy Director General, there has been a temptation for me to try and evaluate what has happened in RCA since I began my term as DDG on 1st February 1986. It is of course no secret that I have taken and will continue to take a very keen interest in RCA. I have seen the budgets for RCA rise from US\$1.34 Million in 1986 to a peak of US\$3.28 Million in 1990. Although it now appears that the growth in activities of RCA has come to a plateau, we still have a good level of budgetary resources and a matching technical programme. With the anticipated support from: UNDP for the new project proposal covering 1992 to 1996; Australia for the new project proposal covering 1992 to 1995; and, the yearly Japanese special contribution to RCA, coupled with the IAEA funding, and funding from China, India & ROK, the future prospects appear good. The year 1992 seems to be portentous, having a number of events of significance to RCA which feature the end of one phase and the beginning of another.

For example:

- . This Working Group Meeting marks the beginning of the second cycle of meetings in RCA Member States.
- . The current Agreement for RCA finishes on 11 June and the new Agreement begins on 12 June 1992.
- . The new UNDP funding for the RCA proposal on "The use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development" is hoped to be approved and finalized around the middle of this year so that the programme can begin to be implemented in 1992.
- . The new project proposal from Australia on "The Applications of Isotopes and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine", if approved, is scheduled to begin in 1992 and run until 1995.
- . The expected entry of Mongolia into RCA in 1992. I take the pleasure of introducing Prof. Dalkhsuren - Deputy Chairman/Dr. Ganzorig - Executive Secretary of the Mongolia - Atomic Energy Commission.
- . And, of course, my own involvement with RCA will change when I leave the position of Deputy Director General and Head of the Department of Technical Co-operation on July 31st and am succeeded by Mr. QIAN Jihui.

I would like to look to the future rather than be reflective on the past. In this regard I would like to share two thoughts with you.

Firstly, RCA has demonstrated success for 20 years as a regional cooperative venture. This could not have been achieved without the desire of Member States to put aside political difficulties and concentrate on the technical challenges. I believe that all Member States must be constantly on the alert to ensure that this regional cohesion is not lost because of the intrusion of political and administrative barriers particularly to the ready movement of scientists, technologists and engineers when they are attending meetings or undertaking missions on RCA activities.

Secondly, RCA countries have matured a lot in the past 20 years and we have seen enormous growth in the economies as well as the technical and scientific capabilities of Member States. In spite of this growth, some Member States are still reluctant to take on more of the responsibilities for financing and backstopping the RCA programme. What we have is a co-operative agreement and there should be a conscious move towards the ultimate goal of equal partnership. It is not just the developed countries that need to help the developing Member States. Unless there is the desire for the developing countries to shoulder the responsibilities of assisting those less well off than themselves, the process of redressing the North South technological and economic inequalities will not accelerate.

In conclusion I would like to extend my best wishes to all the Delegates here, many of course have shared with me the pleasures of participation in such an active forum over many years. The vitality of our endeavours and aspirations for RCA will, I am sure, give us plenty of stimulating interactions over the next four days and will ensure that an appropriate and responsible programme is established for the future.

Thank you.

OPENING ADDRESS AND OFFICIAL OPENING

OF THE 14TH RCA WORKING GROUP MEETING

BY MR. TAKAYA SUTO

DIRECTOR-GENERAL FOR SCIENTIFIC AND TECHNOLOGICAL AFFAIRS,

MINISTRY OF FOREIGN AFFAIRS, JAPAN

Mr. Chairman,

The distinguished representatives of the IAEA,

The distinguished delegates from the RCA Member States,

Ladies and Gentlemen,

I would like to take this opportunity to express that it is an enormous privilege and honour for Japan to host this 14th RCA Working Group Meeting in Tokyo. 13 years ago the very first meeting of the RCA Working Group was held in Tokyo, and now for the second round we are the first to host the meeting in the year to celebrate the 20th anniversary of the establishment of the RCA. It is indeed a pleasure for us therefore, to share this opportunity with you all, and I welcome all the delegations, and two observers from Mongolia who has shown interest in the RCA activities.

Bearing in mind the recent world situation on the peaceful uses of nuclear energy, Japan considers the role of the IAEA to be increasingly more important, from the view point of the non-proliferation of nuclear weapons, the enhancement of nuclear safety, and the promotion of peaceful uses of nuclear energy. Nuclear energy plays an important role through the uses of radioisotopes, radiation, and energy in various fields, such as agriculture, industry, radiation protection, medicine, and so on. Many lives have been saved through the advancement of nuclear medicine, for instance. We therefore consider that the IAEA's activities in the field of technical co-operation, research and isotopes, and public acceptance are very important, and that Japan will continue to provide as much support to these activities as possible.

In this regard Japan sees the RCA as 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, radiation protection, and agriculture, we should not disregard the importance of peaceful applications of nuclear energy 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, a most important vehicle for co-operation of this kind, and we hope to see continuously the spirit of mutual co-operation, 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 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 and excellent communication 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.

I would here like to express on behalf of all the RCA Member States our special gratitude to Dr. Noramly, who has been serving since June 1986 as Deputy Director-General of the IAEA in charge of technical co-operation. We regret to learn that Dr. Noramly will be leaving the IAEA this summer. During his term of office he made enormous contribution to the RCA. We would like to thank you, Dr. Noramly, for your excellent leadership which made possible the development of the RCA activities, and wish you success in your next career.

Mr. Qian Jihui, Director-General of the Nuclear Power Institute of China, was officially announced at the IAEA February Board of Governors Meeting as successor to Dr. Noramly. On behalf of all the RCA Member States I would like to congratulate Mr. Qian on his appointment, and heartily welcome him to the post.

Mr. Chairman,
The distinguished representatives of the IAEA,
The distinguished delegates from the RCA Member States,
Ladies and Gentlemen,

Wishing that this Working Group Meeting will produce good results and will make an important contribution to the further development of the RCA activities, I hereby declare open the 14th RCA Working Group Meeting in Tokyo.

REMARKS ON RCA ACTIVITIES IN 1991

Dr. Noramly,
Dr. Machi,
Dr. Suto,
Dr. Ishida,
Dr. Easey,

Distinguished delegates,
Ladies and Gentlemen,

It is a great pleasure for me to be here, at the 14th RCA WGM, on these spring days of Tokyo. May I, on behalf of all of you to express our sincere thanks to the Government of Japan for its kind hosting of the Meeting. I also would like to convey to you the warmest greeting from Professor Pham Duy Hien, the Chairman of the 13th WGM and his apology for not being able to come here.

Distinguished delegates,

Last year was a turning-point year. The RCA of 1987 is expiring, the second phase of the largest RCA project - the UNDP/IAEA/RCA Industrial project has also terminated. Under these circumstances, I am happy to note that RCA activities in the year of 1991 have been running smoothly and we have come to the sufficient decisions, such as:

- All RCA Members agreed upon the extension of the RCA for another 5 years and keeping the present wording of the agreement for its renewal. (20th GCM of RCA, Vienna).

- The draft of the UNDP Regional Industrial Project was adopted (13th RCA WGM, 20th GCM of RCA) and it was submitted to the UNDP in New York for consideration. I hope that UNDP will take note of the high level of endorsement given by Member States to this project proposal and that adequate funds will be made available. Now turning to the year of 1992, I see it as a difficult but promising one. I hope that donor countries will help us to cover the gap in budget of the UNDP project. In this regard, I highly appreciate the new project proposal of Australia. I do believe that the 14th RCA WGM will spark off a busy year of RCA activities.

As interim Chairman, I would like to extend my sincere thanks to all RCA delegates for the effective contributions and supports to RCA activities in 1991.

I wish you all a good health and the success of our meeting.

Thank you.

AGENDA

FOURTEENTH RCA WORKING GROUP MEETING
Tokyo, Japan, 24-27, March 1992

Tuesday, 24 March 1992

08:30 Registration

09:00 **INAUGURAL SESSION**

1. Welcome Address by Mr. Hirohito Ishida, Director-General of Atomic Energy Bureau, STA
2. Welcome on behalf of IAEA by Prof. Noramly bin Muslim, Deputy Director General Department of Technical Co-operation
3. Opening Address and Official Opening by Mr. Takaya Sutoh, Director-General for Scientific and Technological Affairs, MOFA

09:30 **FIRST ADMINISTRATIVE SESSION**

Chairman: Prof. Ngyuen Tien Nguyen
Chairman-elect: Mr. Yoshiyuki Sadaoka

4. Election of Chairman and comments by Chairman-elect
5. Adoption of Agenda
6. Draft RCA Annual Report, 1991
7. Election of Chairmans of Project Committees (Article VI of Agreement refers)
 - a) Medical
 - b) Agricultural
 - c) Nuclear Science and Energy Based Projects
 - d) Radiation Protection

10:15 Coffee Break

10:30 **FIRST TECHNICAL SESSION**

Chairman: Mr. Yoshiyuki Sadaoka

Regional Industrial Project

8. Report on 1991 activities
9. New UNDP/RCA Project Proposal

10. Bridging Activities for 1992

12:30 Lunch

Continuation of **FIRST TECHNICAL SESSION**

13:45 11. New Project Proposal from Australia

12. Concluding Remarks by Chairman

14:05 **SECOND TECHNICAL SESSION**

Chairman: Mr. Yasuhito Sasaki

Medical and Biological Applications of Nuclear Techniques

13. Constitution of Project Committee

14. Technical Co-operation (TC) Projects

14.1 "Radioimmunoassay of Thyroid Related Hormones"

14.2 "Radioimmunoassay for Hepatitis B Diagnosis"

14.3 "Radiation Sterilization of Biological Tissue Grafts"

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

18. Concluding comments by Chairman

14:50 **THIRD TECHNICAL SESSION**

Chairman: Mr. Nobuo Murata

Agricultural Projects

19. Constitution of the Project Components

- 20. Technical Co-operation Project and CRP Components
 - 20.1 "Food Irradiation Process Control and Acceptance"
 - 20.2 "Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen"

15:30 Coffee Break

15:45 21. New Project Proposals

18:30-20:30 Reception hosted by MOFA

Wednesday, 25 March 1992

09:15 Continuation of **THIRD TECHNICAL SESSION**

- 21. New Project Proposals
- 22. Concluding Comments by Chairman

10:15 **FOURTH TECHNICAL SESSION**

Chairman: Mr. Eiji Shirai
Advisor : Mr. Tsuneo Fukuhira

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"

10:45 Coffee Break

11:00 Continuation of **FOURTH TECHNICAL SESSION**

- 25. Energy Based Technical Co-operation Projects
 - 25.1 "Pre-Project Activities and Manpower Development/Nuclear Power Project Planning" (KAERI) Training Course
- 26. New Project Proposal
- 27. Concluding comments by Chairman

11:40 **FIFTH TECHNICAL SESSION**

Chairman: Mr. Sadayoshi Kobayashi

Radiation Protection Projects

28. Constitution of the Project Committee

29. Technical Co-operation (TC) Projects

29.1 Radiation Protection Infrastructures

29.2 Personal Dosimetry

12:30 Lunch

14:00 Continuation of **FIFTH TECHNICAL SESSION**

30. Co-ordinated Research Programme (CRP)
 - Reference Asian Man

31. New Project Proposals

32. Concluding Comments by Chairman

COUNTRY STATEMENTS

33. Reception of Country Statements

15:00 Coffee Break

15:15 **SECOND ADMINISTRATIVE SESSION**

Chairman: Mr. Yoshiyuki Sadaoka

34. Renewal of RCA Agreement

18:30 - 20:30 Reception hosted by STA

Thursday, 26 March, 1992

Field visit to Takasaki Radiation Chemistry Research Establishment (TRCRE) JAERI.

Friday, 27 March 1992

Return from Takasaki.

15:00 Continuation of **SECOND ADMINISTRATIVE SESSION**

35. RCA Action Plan 1992

36. RCA Cost Projections 1992

37. Other Business

16:00 Coffee Break

16:30 **CLOSING SESSION**

38. Acceptance of Draft Documents

39. Closing Remarks by IAEA

40. Official Closing

Draft RCA Annual Report - 1991
Comments by the RCA Coordinator

Mr. Chairman, Distinguished Delegates, I would like to make just a few comments about the 1991 Annual Report. The first remark concerns the purpose of the Report. I see that this document has two purposes to fulfill. It should be an historic record detailing the records, the events and the personnel involved in that year. I also believe that it should be a reference document containing essential details on RCA so that it is not necessary to search in other reports to extract relevant information. Much of this second goal is contained in the various annexes at the end of the report.

Concerning the layout of the report itself, summaries of the 13th RCA Working Group Meeting and the 20th RCA General Conference Meeting are given in Chapter 2. The 1991 Technical Programme is summarized in Chapter 3 and the RCA resources are summarized in Chapter 4.

Mr. Chairman, my next remark concerns the management of the RCA projects. I believe that the success that RCA has achieved over the past years owes much to its effective communication systems such as the networks of: national RCA Coordinators; UNDP National Counterparts; and project and sub-project Co-ordinators and all should be congratulated for their efforts. For those projects where the national nuclear research institute is not the end user of the technology as is the case in many biological, medical and agricultural projects, the coordinators have a heavy responsibility for sustaining and maintaining the programmes to these target beneficiaries and providing the necessary two way communications. Most projects have these networks and they are listed in the annexes. I hope that Member States will continue to recognize the importance of these roles and make available such resources as are necessary so that these people can have the capability of fulfilling their obligations. As far as the Agency is concerned there is a need to ensure that the future project activities are well defined so that all parties can plan effectively. In our region we have bilateral and multilateral projects outside of the IAEA and RCA operating in very similar areas of nuclear technology. It is essential that there is good coordination of all these activities to ensure that overlap is reduced to a minimum and more importantly that national groups responsible for specific areas of technology are not so swamped by their obligations to many different agencies that they become overwhelmed and cannot supplement the programmes effectively. The decisions on such issues are clearly the responsibilities of Member States but from the Agency's side we have the potential to assist in coordination if requested and also we can help the overall planning through the provision of our

timetable of activities for future years such as have been generated from Project Formulation and Expert Advisory Group Meetings. The third and final remark is directed towards the problems associated with the financing of RCA and the budget. 1991 activities had a budget of US\$2.8 million. In 1992 without any new UNDP funding the budget will be reduced to US\$2.2 million. The problems associated with the general funding of the IAEA's regular budget and the continuing problem of decreasing levels of pledges and payments to TACF have the potential to cause significant problems with the Agency's Technical Cooperation programme. RCA was in a happier position than most because only 20% of the 1991 funding came from the Agency but in 1992 this percentage could rise significantly to almost 40% making a larger portion of the programme vulnerable. Member States are urged not only to pay their voluntary contributions of TACF in full but also to start or increase extra budgetary contributions to RCA.

Let us hope that the 52% increase in extra budgetary donations to RCA contained in the new project proposal by Australia for 1992-95 will be matched by similar increases by other Member States. There can be no increase in the RCA budget unless the financial resources come from outside the Agency's funds. In the Working Group Meeting Background Papers there are a number of new project proposals that have been submitted by IAEA technical officers. These have arisen from their overview of this and other regions' needs and these proposals have been made to highlight to Member States those technological needs that have a regional dimension and may not be so obvious on a national level. It needs to be carefully noted that the presentation of such proposals does not in anyway imply Agency funding support. If new projects are to be incorporated into the RCA programme, others will have to be either terminated or reduced in budget to accommodate these new activities. At various RCA fora over the last 18 months there has been a call to reduce the number of RCA projects and concentrate on more in depth programmes in recognition of the maturing nature of nuclear technology in the region and the specific need for manpower development in particular technologies rather than the former requirement for a broad general approach. I am certain that there will be active consideration and debate on all these topics over the next few days. I look forward to receiving your comments and suggestions regarding the content and form of the draft RCA annual report for 1991 currently before you.

Thank you.



4 March 1992

013812

Dear Mr. Polansky,

Subject: Programme proposal for the use of Isotopes and Radiation to strengthen Technology and support Environmentally Sustainable Development - ICP 5.

Thank you for your letter of 12 February 92 concerning MAC-5 and RCA/IAEA proposal for the above-noted programme for ICP-5.

As you are aware, Mac-5 called for a greater involvement of the Field Offices and participating countries in the formulation and implementation of programmes during ICP-5.

Accordingly, proposal for the above-mentioned programme has been forwarded by us to the Field Offices requesting them to get in touch with the respective governments to reascertain their views and continued interest and forward the same to us along with their views. We have also sought their opinion on possible implementation and monitoring arrangements. In order to encourage cost-sharing and parallel financing, it has been suggested that the programme be developed as a framework not only for IPF funding but also for funding by other donor agencies. A copy of our letter on the subject to our field offices is enclosed for ease of reference.

We shall be getting in touch with you once we hear from our field offices and also from the participating countries.

Regards.

Yours sincerely,


Sebastian K. Zacharia
Chief

Division for the Regional Programme
Regional Bureau for Asia and the Pacific

Mr. Edward A. Polansky, Deputy Director
Head, Programme Co-ordination Section
Department of Technical Co-operation
I.A.E.A.
Vienna





February 28, 1992

Dear David,

Subject: Programme proposal for the use of Isotopes and Radiation to strengthen Technology and support Environmentally Sustainable Development.

Please refer to the discussions in MAC-5 concerning arrangements for greater involvement of the Field Offices and participating countries in the formulation and implementation of programmes for ICP-5.

I am enclosing herewith a copy of proposal for the above-noted programme aiming to address the specific issues of (a) combating the degradation of the environment, (b) strengthening industrial development and (c) improving aspects of public health care. This proposal is in some ways a follow-up of our earlier projects RAS/79/061 and RAS/86/073, and has been retained for further consideration for possible funding out of ICP-5 resources.

During the terminal TPR of RAS/86/073, held on 28 November 91, the participating countries co-ordinators expressed their full satisfaction with the results of the project and reiterated that the regional networks have proved very valuable in sharing the experiences and promoting understanding and acceptance of industries on the use of these technologies for increased productivity and improved quality, reducing raw materials inputs and energy requirements. The national co-ordinators, in that meeting, strongly supported this follow-up programme. The PFF, which has been developed after extensive interaction between the RCA Member States, their experts and technical officers, has been endorsed by the RCA members.

In the terminal TPR meeting, the representatives from Australia and Japan confirmed their support to the follow-up programme and announced their contribution of US\$1.5 million and US\$1.0 million respectively. These funds could be used to provide "bridging" between the termination of RAS/86/073 and approval of the new programme, to ensure continuity of network operations.

Mr. David Smith
Resident Representative
UNDP
Vietnam



We would be grateful for your getting in touch with the Government to reascertain their views and continued interest, and forward the same to us with your own views.

We believe that the size and scope of the programme may have to be limited to the more specific areas of (i) environmental problems and natural resource management; and (ii) technology for development; in order to:

- a. have a clearer and sharper focus on the development objectives of ICP-5;
- b. take full cognizance of severe resource constraints during the fifth cycle, a reduction of 35% from the fourth cycle IPF; and
- c. ensure that the programme is not just an extension of on-going activities and provides for innovative approaches without repeating earlier activities.

Nevertheless, this limitation, in itself, should not detract from evolving a viable programme which would meet the needs and aspirations of the participating countries.

We would also like to have your views on possible implementation and monitoring arrangements keeping in mind the fact that regional and national institutions must be involved, as far as possible, in the implementation of the programme.

Finally, we would request you to please keep in mind the fact that during ICP-5, we wish to encourage cost-sharing and parallel financing, as also a stronger commitment on the part of participating countries. Hence, the programme should be developed as a framework not only for IPF funding, but also for funding by other donor agencies. The possibility of cost-sharing out of country-IPF should also be explored, and commitments from the participating country spelled out in detail.

We would appreciate hearing from you at your earliest convenience.

Kind regards.

Yours sincerely,

Sebastian K. Zacharia, Chief
Division for the Regional Programme
Regional Bureau for Asia and the Pacific

ACTION PLAN 1992
INDUSTRIAL PROJECT BRIDGING ACTIVITIES FOR 1992
Tracer Technology

Date	Venue	Activity	Expert
<u>DEMO/NEMS</u> 8-18 March	Colombo, SRL	Demonstration of Leak Testing of Pipe Line	Dr. Hu Xusheng Dr. Wu Yuanfane Dr. Zhou Shuxuan Dr. Lu Qingqian Dr. Sun Xiaolei
August	INS	Industrial Demonstration of Tracers	Mr. W. Wiblin Mr. T. Kluss
October	PHI	Industrial Demonstration of Tracers	Mr. W. Wiblin Mr. T. Kluss
?	CPR	Industrial Demonstration of Tracers	Australians

Non-Destructive Testing

Date	Venue	Activities	Expert
<u>REGIONAL WORKSHOP</u> 13-24 Jan.	Bombay, IND	Image Processing in Material Science	Indians
<u>EXPERT MEETING</u> May/June	Kuala Lumpur, MAL	Proficiency Testing Programme (PTP) Meeting I	2 Japanese
12-15 Oct.	Tokyo, JPN	Proficiency Testing Programme Meeting II	2 Japanese Mr. R. Gilmour
<u>EXPERT MISSION</u> May/June	INS, MAL, ROK	PTP evaluation	2 Japanese
<u>NATIONAL TRAINING COURSE</u> 13-31 July	Serpong, INS	RT-3	1 Japanese
2 weeks	Ho ChiMinh City, VIE	RT-2	1 Japanese

Radiation Technology

Date	Venue	Activities	Expert
<u>EXPERT ADVISORY GROUP MEETING</u> 26-29 October	Takasaki, JPN	Radiation Technology for Environment Conservation	12 experts
<u>REGIONAL SEMINAR</u> ?	Jakarta, INS	RVNRL	Japanese (IAEA)
<u>EXPERT MISSION</u> 13-23 Sept.	Beijing, Zhuzhou CPR	RVNRL	Dr.K. Makuuchi
<u>SCIENTIFIC VISITS</u>	Jakarta, INS Jakarta, INS	Trial Irradiation VIE Latex (2 x 1m/m) Trial irradiation SRL Latex (2x1 m/m)	

Nucleonic Control Systems

Date	Venue	Activities	Expert
<u>REGIONAL</u>			
8-12 Oct.	Shanghai, CPR	RW/NCS - Steel Industry	1 Japanese 1 Korean 1 UK
?	Mae Moh, THA	RW/NCS - Coal	Australians
?	Mae Moh, THA	RTC - NCS Coal	Australians
?	Mae Moh, THA	REMS - NCS Coal	Australians
<u>EXPERT MISSION</u>			
1 week	Krakatan, INS	NCS - Steel	2 Japanese
10 days	CPR VIE PHI	NCS - Paper	2 Japanese
<u>SCIENTIFIC VISIT</u>			
1 week	JPN	CPR - NCS - Paper	
1 week	JPN	VIE - NCS - Paper	

Project No: RAS/6/011

Project Title: Radioimmunoassay of Thyroid Related Hormones

Project Officer: R.D. Piyasena

Participants: Bangladesh, China, India, Indonesia, Rep. of Korea, DPR Korea, Malaysia, Myanmar, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Vietnam.

A. Operational Aspects

The project became operative in 1987 following a fact finding and planning stage dependent on extensive laboratory surveys and a consultants' meeting, the previous year. It continued to end of 1991. The number of participant laboratories increased from 90 at the inception to over 120 at the end of the project. There were only 2 drop outs.

The essential objectives were to reduce the costs and to improve the analytical reliability of the radioimmunoassay (RIA) of thyroid related hormones which are the commonest performed in developing countries. The means adopted towards achievement of the first objective was to improve the sources of reagent supply, initially by promoting the use of bulk reagent based methodology as an alternative to expensive imported commercial kits and, at a later stage, as expertise was developed, to encourage the local production of the primary reagents required, leading eventually to national/regional reagent sharing and distribution schemes. The second objective was approached by ensuring strict adherence to standard RIA practice with special emphasis on internal quality control (IQC) and modern computer assisted data processing (DP) practices. The establishment of a regional external quality assessment scheme (EQAS) was also envisaged, once the foundation of IQC and good DP had been laid.

Under overall control of the RCA Co-ordinator and the IAEA Project Officer, the project was implemented through a system of national co-ordinator in each country serving as the link between IAEA and national participant laboratories. Each co-ordinator was expected to maintain close links with participants and generally monitor all activities, attend to trouble shooting as far as possible, and send in results to IAEA at regular intervals and in a specified format.

Following identification of participant laboratories from over 150 prospective applicants by means of discussions with national co-ordinators and other relevant authorities such as National Atomic Energy Commissions, the project was implemented by the following means.

1. A bulk reagent supply scheme from a central source in the U.K. with national distribution via the national co-ordinator.
2. The supply of essential equipment, principally computers and a RIA and IQC DP program specially designed and produced as a project activity by IAEA (TECDOC 509).

3. A series of regional training courses supplemented by national ones.
4. Support for local reagent production and the establishment of national/regional reagent distribution schemes.
5. Establishment of regional EQAS.
6. Meetings of national co-ordinators.

Additionally, as a research study, a clinical trial of proposed strategy for "in vitro" thyroid function testing was undertaken in 1989 as a project activity.

B. Summary of Project Activities

B.1 The Bulk Reagent Supply Scheme

This continued for the first 18 months, and longer in exceptional cases. A complete package of reagents (chosen on the advice of a consultant's panel) was sent out to all participants. The intention was to introduce and ascertain the acceptability of the methodology itself and make an initial assessment of its impact on achieving project objectives. Approximately 1 million tubes of RIA reagents were distributed over 2 years. QC Sera was included for the first 6 months to allow a lead time for laboratories to prepare their own.

B.2 Equipment

The major input in the equipment component was the supply of computers to laboratories that did not have a means of machine based data processing. In the course of the project, about 50 IBM PC and compatible computers were supplied from project funds, supplemented where possible from funds available in national TC projects.

The DP software was produced in 1989 as a project funded activity. The programmes (RIA/PC) and the Instruction Manual, (TEC DOC 509) have found wide acceptability and has been made available worldwide, not only to project participants. It is presently being used in over 200 laboratories and may be considered a contribution from RAS/6/011 to Agency projects in other regions of the world.

The rotary mixer needed for the TSH IRMA assay were provided to all laboratories. Among other minor items supplied to some participants as the situation demanded were pH Meters, mixers, stirrers and RIA pipettes.

B.3 Training

Four regional training courses were held, as follows, each of 2 weeks duration.

- Bulk reagent methodology and quality control in the RIA of thyroid related hormones. 1987. Chulalongkorn Hospital, Thailand.

- Data Processing in RIA. 1987. BATAN, Jakarta, Indonesia.
- External Quality Assessment. Chulalongkorn University, Bangkok, Thailand.
- Optimization of Reagent Production Techniques and the organization of reagent distribution schemes. NIH, Northanbuni, Thailand.

The regional courses, attended by international experts, were held at a "train-the-trainer's" level and were, in each case, followed up by national training course to some of which project inputs by way of (regional) experts or reagents were supplied.

B.4 Local reagent production

This was actively supported by means of the training course mentioned above and by expert missions undertaken under the Agency's regular programme. The order of priority, on the recommendation of the consultant's panel, was QC sera, standards, tracers and finally antisera. One individual 6 mm fellowship from RAS/6/011 funds was provided to a worker from Thailand in special connection with production of the TSH IRMA reagents. Special, rather major equipment, (e.g. Lyophilisers, filtration system) were supplied to some laboratories.

B.5 Regional EQAS

This organized at a training course held in Bangkok by IAEA experts Prof John Ratcliffe and Dr Saulat Sufi. Eleven EQA pools were prepared by 3 regional centres in Bangkok, Lahore, and Seoul and randomised samples sent out for assay each month to over 100 laboratories (some of whom were not participating in other aspects of the project). Results were sent in to the control laboratories and to IAEA through the national co-ordinators. From the 3rd year of the scheme, Singapore is serving as an additioanl (4th) EQA sample producing centre.

B.6 Co-ordinators' Meeting

These were held at intervals of 12-18 months in Jakarta, Bangkok, Chiang-Mai, and finally in Colombo. Always attended by at least one international expert, they were organized to coincide with watershed achievements or the completion of some specified project activity (e.g. completion of the bulk reagent supply scheme, end of the first year of the regional EQAS).

B.7 Research Study

A clinical trial of a proposed strategy of "in vitro" thyroid function testing was undertaken as a project activity in 1989. Seven clinical endocrinologists from participant laboratories carried out the research where the essential objective was to test the efficacy of the SS-TSH assay and that for "free" T4 as a diagnostic test especially in "follow up" cases, sick euthyroid syndrome and in patients with binding protein abnormalities.

C. Main Achievements of the Project

C.1 Cost reduction

Laboratories adopting the bulk reagent based methodology introduced under the project have reported very significant reduction in costs, from an average of US \$2.50 per patient sample to less than US \$0.50 within 18-24 months. With local reagent production activity and the availability of reagents at national/regional level subsequently exerting their effects, the costs have been even further reduced and may now be considered to be around US \$0.10 - 0.25 per patient sample.

As a consequence of the cost reduction as above, work loads, i.e the number of patient samples assayed, have increased by an overall figure of 177% from the beginning to the end of the project. This is considered a very sensitive indicator of the project's effectiveness. Added to this is the fact that, in certain countries, the ready availability of "in vitro" tests has caused a reduction in the number of other more expensive "in vivo " diagnostic procedures such as thyroidal ¹³¹I uptake studies, sometimes by as much as 75%. The funds saved have been used to expand RIA services by introduction of assays for other analytes of clinical importance.

C.2 Increase of analytical reliability

A major impact has been on the promotion of good RIA practice with emphasis on quality control which is now satisfactorily adopted by every participant laboratory. Combined with modern computer assisted data processing methods also introduced, the analytical reliability of results has been ensured to a far greater extent than at the commencement of the project.

The regional EQAS, which has been found very acceptable irrespective of whether laboratories use bulk reagents, kits, or even non-isotopic methods, further ensures the validity of the results now being produced.

C.3 Manpower development

The regional "train-the-trainer" courses and the follow up national courses held in most countries have resulted in over 400 persons receiving training in RIA procedures using bulk reagents. National training courses are now being established on a regular basis in some countries while, in others, new recruits (technicians) are receiving an "in-service" training at participant laboratories. Three national co-ordinators have served as IAEA experts at national courses held in other countries.

C.4 Local reagent production

The situation has been improved from that of virtually total dependence on imported materials to one wherein the primary reagents required (except for ¹²⁵Iodine for labelling) are all available either nationally or from a regional source close at hand. While antisera and tracers for the T3 and T4 assays are being made at

several centres, the production of sophisticated reagents (including monoclonal antibodies and standard) for the TSH IRMA in two participant laboratories in one country, Thailand, is specially mentioned.

With reagents increasingly available, they now began to be shared and distributed at a regional level. The laboratory at INMOL, Pakistan has made an outstanding contribution in this respect and has sent out reagents, without charge, to Myanmar, Sri Lanka, Bangladesh and the Philippines. The total value of these materials, were they imported from a Western supplier even in bulk form, is estimated to be at least US \$14,000. This is the best example of TCDC that the project has to offer. Additionally, Indonesia has provided consignment of reagents to Vietnam. All national reagent production centres distribute the reagents available to other users within the country.

C.5 Clinical and research studies

In addition to the increase in diagnostic workloads mentioned above, several countries have made use of the opportunity provided by the increased availability of reagents at acceptable cost to embark on screening programmes for neonatal hypothyroidism. There are also about 20 research studies, in the thyroid field, ongoing in 5 countries using the technology introduced under the project and at least 4 papers have already been published.

D. Final Evaluation

With the essential objectives achieved, IAEA may be considered as having fulfilled its responsibilities and the project may generally be considered to have ended. However, certain specific areas where continued support is required still remain. These include the regional EQAS, the regional reagent distribution scheme, (both of which are not yet viable enough to be self-sustaining), and the clinical trial of thyroid function testing strategy which is also still ongoing. Finally, and of probably the greatest importance, is that this Asian group which has worked and collaborated well over the past 4 years should not be allowed to break up. It is proposed that meetings concerned with the ongoing activities such as the EQAS, etc. be supported as satellite events when national co-ordinator's meetings are organized under Project RAS/6/018, "Diagnosis of Hepatitis B infection by RIA" which replaces RAS/6/011 in 1991. The network of laboratories and the international collaboration achieved during the previous project could then be maintained and developed further.

Project No:

RAS/6/018

Project Title:

Diagnosis of Hepatitis B infection by
Radioimmunoassay (RIA)

Project Officer:

R.D. Piyasena

Participants:

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

A. Operational Aspects

The project commenced activities in 1991 and replaces RAS/6/011 "RIA of Thyroid Related Hormones" in the RCA countries. It seeks to build upon the infrastructure created by the previous project by way of a network of regional laboratories adequately equipped, with trained staff, and good RIA practice well established, to provide economical and reliable diagnostic tests for a selected panel of Hepatitis B markers.

Activities to date have included a consultants' meeting, a training course and a meeting of national co-ordinators. The consultants' meeting was held in 1990 and identified the techniques to be employed as well as the components of the screening panel. These will be Hepatitis B Surface Antigen (HBsAg) and antibody (HBsAb), Hepatitis B Core Antigen (HBcAg) and Hepatitis B e Antigen and antibody (HBeAg & HBeAb). It was also advised that the studies be directed to 4 population groups for clinical diagnosis (as in jaundiced patients), in high risk groups such as pregnant mothers, in blood transfusion units and finally for epidemiological studies.

The regional training course held in Shanghai in March 1991 served to introduce the methodology concerned. Sets of reagents in complete kit form from 4 alternative suppliers were also evaluated during the practical classes. Sample sets of reagents were then sent out to 8 countries for further evaluation.

The first meeting of national co-ordinators, held in Colombo in October 1991, served to identify prospective participant laboratories of which there are, at present, a total of 37. Laboratories in the Republic of Korea, Singapore, Thailand and Malaysia, which already have extensive screening programmes, will serve primarily as testing and evaluation centres. The sources of reagent supply were also selected on the basis of the results available on the testing experiments.

B. Work Plan for 1992

Albeit that the suppliers of the reagents needed (from China) have been selected, further more extensive testing is required with the inclusion of standard or common samples that need to be distributed to all participants. These will be obtained from W.H.O. or other sources. Some essential equipment, mainly an automatic bead washer, is needed for all laboratories and these will be supplied. First deliveries of reagents will follow thereafter, in the first quarter of 1992.

The methodology is planned for full establishment by the 3rd quarter of 1992 and attempts to introduce the local production of at least some of the primary reagents required will be made by the end of the year. Towards this, a regional training course on basic reagent production methods for the RIA of Hepatitis B markers is planned for 1992. The next meeting of national co-ordinators will be held in early 1993.

5542M

PROSPECTUS

Title: Review Meeting for the RCA project "Radiation Sterilization of Tissue Grafts" (RCA) (RAS/7/003)

Suggested venue: Philippines General Hospital Tissue Bank and Philippine Nuclear Research Institute (PNRI), Quezon City, Philippines

Date: 3 to 8 August 1992

Background and objectives:

The initial phase (1986-1991) of the RCA project on radiation sterilization of tissue grafts for safe clinical applications and tissue banking in developing RCA countries has involved:

- (i) dissemination of current techniques for radiation processing of biological tissue grafts, such as bones of different specifications; skin; dura; fascia; chorion-amnion; tendon; etc.,
- (ii) radiation-sterilization dose-setting criteria for tissue grafts in view of estimated bioburdens (including GMP practices) and intended graft qualities for remedial purposes in recipient patients;
- (iii) clinical and surgical applications of sterile grafts on rehabilitative patients with follow-up on graft performance;
- (iv) national TC projects on tissue banking of radiation-sterilized grafts;
- (v) topical training courses on tissue-graft processing.

The RCA project RAS/7/003 starting in 1992 represents the second phase, whereby closer regional integration will be emphasized in tissue procurement, processing and radiation sterilization through standard optimized regionally-usable protocol development and adherence thereto by the countries of the Asia and Pacific region. The anticipated beneficial outcome of such integrated regional (RCA) co-ordination in tissue banking should provide tissue graft cost economy; health safety; sterility and clinical remedial quality assurances; uniform regulatory guidelines (such as manuals); and research and developmental support for improved graft quality (QC); to impact enhanced RCA regional health welfare returns. The critical thoroughgoing review of progress in the RCA Project Review Meeting by the individual RCA country project counterparts

should thus help develop an harmonized protocol and complementation with concomitant upgrading of the status of tissue grafts as an RCA indigenous resource through beneficial applications of radiation processing technology with economy, and as a valid avenue for substitution of commercial graft sources. The purpose of the RCA Project Review Meeting should also involve expert recommendations on the future work schedule with discrete programme activities for the identified needs of the RCA regional health-care. Scope and action plans to sustain regional inter-country co-operation to support manpower training and hands-on-experiences dissemination should also be highlighted in the meeting proceedings in keeping with the RCA goals.

Prospective
participants at
the RCA Project
Review Meeting:

The counterparts of the following relevant national tissue banking (country) projects are expected to present up-to-date status reports for co-ordination, review and deliberations for recommendations: BGD/7/005; BUR/7/004 (Dr. Myo Myint as non-RCA counterpart, if feasible); CPR/7/003; INS/7/002; MAL/7/002; PAK/7/002; PHI/7/003; SRL/6/017; THA/8/009; and VIE-93-94 (Dr. Tran Bac Hai at the Dalat centre).

Expected output:

Project (RAS/7/003) report from the proposed Review Meeting (if held) should identify future action plans and itemized programme activities:

- (i) to help foster regional (RCA) integration on harmonized tissue banking;
- (ii) radiation-sterilized grafts of superior clinical quality;
- (iii) safe surgical applicability on reconstructure health-care cases with systematic follow-ups;
- (iv) tissue research (research and development) for further clinical quality improvements, as feasible;
- (v) relatively greater advanced RCA tissue banking centres should host trainees from other RCA countries in need, and should also provide, as appropriate, expert assistance from within the RCA region.

Suggested agenda
outlines for the
RCA Project Review
Meeting:

The RCA Project Review Meeting should encompass topical areas as follows:

- (a) Inventory of tissue processing steps as currently practised in the RCA countries.
- (b) Validation of tissue processing steps in the context of grafts' intended clinical function(s).
- (c) Formulation of tissue banking guidelines for radiation-sterilized surgical grafts.

- (d) Steps successfully perfected in some RCA countries to ensure donor criteria; tissue parameters; packaging; labelling; distribution; record-keeping and feedback for protocol.
- (e) Manual adapted to RCA regional conditions (including socio-econo-religious environments) and Asia and Pacific Association of Tissue Banking of Radiation Sterilized Grafts; effective techniques, including nuclear methods for screening against donor's contamination risks; donor promotion and legal implications; beneficial interactions with inter-regional tissue banking associations (e.g. North American; European; etc.).

TABLE 1

Action necessary to consolidate and share experience gained in Asia Pacific Region in the use of radiation for sterilizing tissue grafts

STATUS REVIEW Each Bank is requested to provide the following information	DISSEMINATION OF INFORMATION	QUALITY CONTROL (Good Manufacturing Practice)	EXCHANGE OF SAMPLES	RESEARCH & DEVELOPMENT
1. Detailed description of the activity being pursued in each Bank 2. How is financial support for the Bank being obtained? 3. Names and addresses of professional contacts in subject 4. List of literature references in tissue banking techniques and in clinical specialities using grafts 5. Details of prices and commercial sources of supply of alternatives 6. Ethical and regulatory situation in country; is there a law controlling procurement and transplantation? 7. Details of medical contraindications being screened	1. What methods are being used in country to disseminate information about the subject? 2. Give details of any: 2.1 Video material of processing or surgical practices 2.2 Media coverage 2.3 Details released to professional bodies 2.4 Conferences or Seminars 3. Have any overseas experts visited? Please supply copies of any reports 4. Give details of your scientific/medical publications which relate to Tissue Banking	1. Describe in detail the methods you use to prepare tissue grafts ● Membraneous tissue ● Skin ● Bone 2. Which are the Technical Manuals which you regularly refer to? 3. What are the Quality Control procedures you employ? ● Freeze drying efficiency (H ₂ O) ● Microbiological ● Chemical ● Physical 4. What criteria do you use to finally approve the graft before use 5. Do you have any method of measuring the storage life of the grafts? 6. Are you able to accurately measure the radiation dose given to your grafts?	1. Do you exchange samples with other centres? 2. Would you wish to participate in an exchange programme? 3. Are you subjected to an external validation of the practices in your Tissue Bank? 4. Do you favour such external inter-country validation?	Describe your R & D programmes which relate to: 1. Radiation effects on tissue grafts 2. Processing effects on grafts 3. Packaging 4. Utilisation of grafts ● in animals ● in humans 5. Economic aspects of Tissue Bank operation 6. Effect of local conditions on your operations

Project No.	E1.30.06
Project Title:	Quantitative Evaluation of Imaging Procedures for the Diagnosis of Liver Diseases - Phase II
Project Officer:	G. Nair
Participating countries:	Austria, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Pakistan, Philippines, Singapore, Thailand

Quantitative evaluation of imaging procedures for the diagnosis of liver diseases - Phase II is reaching its final stages and is expected to be completed by the year 1992 with a final Research Co-ordination Meeting.

Project No.	E1.30.05
Project Title:	Radioaerosol Inhalation Imaging for the Diagnosis of Respiratory Diseases in Developing Countries
Project Officer:	G. Nair
Participating countries:	Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Pakistan, Philippines, Singapore, Thailand

Radioaerosol inhalation imaging for the diagnosis of respiratory diseases in developing countries has been extended for one more year to specifically examine the effect of atmospheric air pollution on the lung permeability function, as atmospheric air pollution is becoming a major public health problem in the major cities of developing countries. The programme is expected to be completed by the end of year 1992 with a final Research Co-ordination Meeting. Work on publication of the atlas "Radioaerosol lung imaging in chronic obstructive pulmonary disease" is almost completed and the atlas is expected to be published in early 1992.

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 programme and TC project in the field of nuclear 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. The project RAS/4/008 was planned to collaborate with CRP on "Care and Maintenance of Nuclear Medicine Equipment in Asia" from the beginning.

Major Activities in 1991

1. One national training course on Quality Control of Nuclear Medicine Instruments after Repair was held in Malaysia for 2 weeks in August 1991. One English expert and one expert from Thailand delivered lectures, demonstrated quality control tests and preventive maintenance, did tuning and repairs sequentially in 4 major hospitals.
2. Four national training courses on Quality Control and Preventive Maintenance of Advanced Nuclear Medicine Instruments were held in four major cities of China sequentially one week in each city. Two experts carried out lecturing and instructing the practice which were well received by 80 participants from all over the country.
3. Co-ordinated training activities with RAS/4/012 were conducted in the field of maintenance of advanced power suppliers and multichannel analyzer add-on cards.
4. Six sets of slide/videotape packages on quality control and preventive maintenance of advanced nuclear medicine equipment were obtained and sent to China, Malaysia, Philippines, India, Republic of Korea and Pakistan, respectively, which have significantly promoted national training activities in the field.
5. About US \$10,000 was spent on urgently requested spare parts to keep very important instruments running and some repairs were conducted by manufacturers when local service does not exist.

Proposed Activities in 1992

The emphasis of the project is moving to the integration of preventive maintenance and quality control tests, mainly for nuclear medicine instruments and equipment. There has been a big jump on increasing number of gamma camera/SPECT systems in the region in the past two years, e.g. 20 of 1989 v.s. 51 of 1991 in Republic of Korea and 21 of 1989 v.s. 70 of 1991 in China. The project must be timely adjusted to cope with such fast development of nuclear medicine based on its instrumentation advance.

1. The 2nd Regional Formulation Meeting will take place in February 1992 in order to set up a strategy and priority for the project implementation and its further development in 1992 and in the coming 3 or 5 years. A networking approach for better cooperation and more self supporting in the region will be formulated.
2. Shift of some training activities on quality control and preventive maintenance from regional to national level are planned. Meanwhile an effort will be put on training activities for more advanced nuclear medicine instruments at regional scope.
3. A regional workshop on diagnostic and tuning know how on the most popular brands of gamma cameras will be held by the end of 1992.
4. Quantitative and systematic approach for spare parts supply and urgent repairs

THIRD TECHNICAL SESSION ON AGRICULTURAL PROJECTS
OPENING ADDRESS BY PROJECT COMMITTEE CHAIRMAN, DR. N. MURATA

Above all I would like to express my gratitude for the honor given to me to chair this important meeting. Taking this opportunity I would like to make a few words on the role of radiation and isotopes in the agricultural sciences in Japan.

In all the areas such as soil science, agricultural chemicals, entomology, animal sciences as well as food science and plant breeding, we owe very much to the use of isotopes and radiation which was encouraged by IAEA from its very early days.

Sterile male technique to eradicate insect pests from a defined area proved to be useful and the local economy of our southwestern islands are now receiving the return from the huge investment. Mutation induction using chronic as well as acute irradiation facilities are producing interesting genetic resources. A Japanese pear mutant which was produced after more than fifteen years of chronic gamma irradiation is resistant to black spot disease to save the chemicals and labor and also to save the environment from the contamination by the chemical residues. Evaluation of biological nitrogen fixation is still actively performed not only by the ^{15}N application but also by natural abundance technique, for some part in collaboration with institutions in other Asian countries such as Thailand. In the wake of the new trend of biotechnology, radioisotopes contributed much to the development of new technologies to index elusive plant pathogens such as viruses, viroids and mycoplasma-like organisms as well as to diagnose plant genes.

These studies are performed by the national research system under the Ministry of Agriculture, Forestry and Fisheries, prefectural research institutions, universities and more and more actively by private sectors as well. (We have a professional in the Japanese delicate:

Dr. T. Hayashi
Chief, Radiation Technology Laboratory
National Food Research Institute
Ministry of Agriculture, Forestry and Fisheries.

He may be available for informal communication on the issue of his expertise.)

ASIAN REGIONAL COOPERATIVE PROJECT
OF FOOD IRRADIATION WITH EMPHASIS ON
PROCESS CONTROL AND ACCEPTANCE
(RPFI-PHASE III)

STATUS OF RESEARCH AND DEVELOPMENT

Disinfestation of stored food

Considerable loss of cereal grains, pulses and other dried products occurs in storage due to infestation of insects. R & D activities carried out over 30 years in this region show that irradiation could be an effective method to control stored product insect pests. As a continued effort to transfer this technology to industries Bangladesh has been conducting semi-commercial studies with irradiated pulses and dried fish. Packaging materials available in the country were tested to check reinfestation of insects. Promising results were achieved. Irradiation of rice and mungbeans has been carried out in Thailand with commercial quantities. Evaluations of irradiated products are being made. Similar disinfestation studies in Indonesia show that quality of irradiated rice is not affected by irradiation. Vietnam is conducting studies on disinfestation and decontamination of dried fish. This study will be conducted in large scale with the demonstration irradiation facility in Hanoi which has been established at the end of July 1991. The Republic of Korea is carrying out activities on the quality improvement and shelf-life extension of boiled-dried anchovies. A transportation trial has been performed between Korea and India, and another one with Korea and Indonesia. Laminated packaging materials (NY/PE. Laminated film) have been used successfully to store boiled-dried anchovies for 10 months.

Disinfestation of tropical fruits

The Asia and Pacific region produces large quantities of tropical fruits for home consumption and export. Since a common fumigant ethylene dibromide has been banned for use in many importing countries (i.e. U.S.A., Japan, EEC countries) as quarantine treatment irradiation has been found to be an alternate method to meet these requirements. India is carrying out studies on the disinfestation of mangoes from mango seed weevils. Parameters are being established to follow the appropriate procedure to control weevils in mangoes. Similar studies are being carried out in the Philippines to control fruitflies from tropical fruits. During the period of this project it is anticipated that trial shipments of irradiated tropical fruits will be made with the importing countries in order to establish the efficiency of this treatment in international trade.

Sprouting inhibition of potatoes, onions and garlic

Irradiation has been found as a viable method to control post harvest loss of roots, tubers and bulbs due to sprouting. Technology transfer activities are being carried out in Bangladesh, China, and Pakistan. Bangladesh has developed a forced ventilation storage structure for commercial storage of irradiated onions. Pilot scale irradiation of potatoes, onions and garlic are being continued in China and Pakistan. A transportation trial of irradiated onions is being arranged between India and Sri Lanka.

Decontamination of meat, fish and fishery products

Pakistan is conducting studies on decontamination of poultry by irradiation. Irradiation of poultry at 5 kGy followed by storage at -20°C showed significant reduction of bacterial load even after 5 months. The Philippines is conducting studies on frozen and chilled prawns in order to extend shelf-life and improve hygienic quality. Physico-chemical and organoleptic qualities of irradiated products are being evaluated. Thailand is using a combination of radiation, packaging and temperature to improve shelf-life of smoked shrimps. Modified atmosphere, packaging and radiation are being used to extend shelf-life of cooked shrimps. Irradiation is also being used to improve the quality of value added fishery products such as fish burger and frozen breaded shrimps. Japan is conducting irradiation studies to eliminate pathogenic micro-organisms from imported frozen shrimps.

Decontamination of spices and dried vegetables

This region is the largest exporter of spices. Spices are often a source of contamination in food. A number of studies are being conducted on decontamination of spices by irradiation to improve their hygienic quality. These studies are being carried out in China, India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan and Sri Lanka. Pilot scale irradiation studies are being conducted in Korea, China and Malaysia. Indonesia has commercialized the irradiation of spices. Joint transportation studies and evaluation of spices are being carried out by Japan, India and Sri Lanka. Decontamination of dried vegetables is also being done in China and Korea. Studies leading to the detection of irradiated spices and dried vegetables have been undertaken by China and India.

Process Control of Irradiated Food

Good manufacturing practices have been maintained during the processing of foods by irradiation. Particular emphasis has been placed on the good irradiation practices by all participants in this project. However, Australia, Thailand and Malaysia are conducting detailed studies on dose mapping in the packages containing food products. This information will be exchanged among the participating countries in order to facilitate control of irradiated foods.

Test marketing and public acceptance

Several regional countries are conducting test marketing of irradiated foods. Bangladesh is conducting test marketing of irradiated onions, pulses and dried fish. China is conducting test marketing trials on apples, garlic, onions, spices, litchi, potatoes, dried vegetables, etc. Pakistan is conducting transportation and test marketing studies on potatoes and onions. Such studies are being planned in Sri Lanka. Thailand and Malaysia. Public information materials have been produced by Bangladesh, China, India, Thailand and Sri Lanka. Consumers' attitudes towards irradiated foods have been collected in Bangladesh, China, Korea, Thailand and Pakistan. Similar studies have also been done in Indonesia. Results of these studies indicate that adequately informed consumers accept irradiated foods.

SECOND RESEARCH CO-ORDINATION MEETING (RCM), JAKARTA, INDONESIA, 15-19 JULY 1991

The Second RCM of RPF Phase III was held in Jakarta, 15-19 July 1991. It was attended by the participants from Australia, Bangladesh, China, India, Indonesia, Japan, Korea Republic of, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. The participants discussed on the programmes of the project and made a plan of activities for the next two years of the project (1992 - 1993).

WORKSHOP ON PUBLIC INFORMATION OF FOOD IRRADIATION

This Workshop was held in Bangkok, Thailand, from 27-31 May 1991. It was attended by 15 participants from Bangladesh, China, Indonesia, Rep. of Korea, Malaysia, Japan, Pakistan, Philippines, Sri Lanka and Thailand. The purpose of this Workshop was to provide factual information on food irradiation to the members of national press corps and consumer organizations of the RCA Member States in order to enable them to disseminate the accurate information on food irradiation to the public.

Upon return to their respective countries, participants wrote a series of articles in their national news papers.

EXPERT MISSION

An expert mission was sent to Sri Lanka from 11-17 November 1990 to assist Sri Lanka Atomic Energy Authority in drafting a Food Irradiation Regulation. An expert mission was also sent to the Philippines from 4-9 March and Indonesia from 11-16 March 1991, to advise on process control and commercialization of irradiation processing. An expert mission was sent to Vietnam from 18-23 March to formulate a R&D programme on food irradiation and advise on the operation and maintenance of the irradiation facility which was commissioned on 26 July 1991. Experts missions were also sent to the Republic of Korea from 6 to 12 October and to China from 14 to 24 October 1991 in order to assist the counterpart in formulating test marketing, consumers' acceptance and commercialization of food irradiation. The expert also gave a series of lectures in seminars in both these countries in various aspects of the practical application of food irradiation processing.

REPORT OF THE TRIPARTITE REVIEW MEETING

The Tripartite Review Meeting (TPR) of project RAS/89/044 - Food Irradiation Process Control and Acceptance was conducted on 19 July 1991 in conjunction with the Second Research Coordination Meeting (RCM) in Jakarta. Mr. M.R. Malhotra, the UNDP Assistant Resident Representative/Chairman of the TPR expressed appreciation to the Government of Indonesia for hosting the Second RCM and the project TPR. The meeting discussed the current status of the activities of this project and concluded that significant progress has been made by the project towards achieving its objectives.

Participating countries appreciated the assistance received through this project in training of manpower through workshops and visits of the international experts in the areas of process control and consumer education. While some of the participating countries have carried out successful consumer acceptance studies, more efforts are needed in this field. In this respect, attention should be given to publish brochures and other media literature in non-technical language which is understood by the general public. The importance of disseminating factual information to the consumer and food industries was emphasized. In addition, it was recommended that the industry and consumers association should, as far as possible, be included in market testing activities. The meeting also recommended that following the planned Seminar in Harmonization of Regulations on Food

Irradiation in January 1992 sponsored by WHO/IAEA/FAO urgent measures may be taken by the participating countries to harmonize their regulations/legislation with the Codex standard of irradiated food.

The meeting endorsed the project performance evaluation report prepared by the FAO/IAEA. The participants from the RCA countries deeply appreciated the financial support of the UNDP for successful introduction of food irradiation processing in Asia and the Pacific.

Project Title: 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 (RAS/5/021).

Project Officer: S.K.A. Danso

The following are notes on the 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" (RAS/5/021) for incorporation into the 1991 Annual Report.

1. An RCM was held at Chiang-Mai in Thailand from 27-31 May 1991. It was attended by eight participants of the programme. At the meeting, participants presented and discussed results of research carried out during 1990/91, after which the follow-up experiments were planned jointly by all participants on four plant breeders from the region invited as consultants to assist largely with the plant breeding and selection aspect of the project.

2. A Workshop on Rhizobium technology was held at the Biological Nitrogen Fixation Resource Centre in Bangkok, Thailand, from 3 to 14 June 1991. Dr. Nantakorn Boonkerd, a participant in RAS/5/021, hosted the course, which was attended by 12 participants from Bangladesh, China (2), Malaysia (2), Pakistan, Philippines (2), Sri Lanka (2), Thailand and Viet Nam. The USAID Programme, NIFTAL based in Hawaii, co-sponsored the course and provided two lecturers. Two staff members of IAEA, Drs. C. Hera and S.K.A. Danso, also lectured in addition to Drs. D. Herridge from Australia and Dr. N. Boonkerd, both participants of the projects. The Workshop consisted of lectures on Rhizobium isolation, testing, identification, inoculant preparation and quality control, nitrogen fixation measurements, etc. Both modern molecular biology techniques and classical approaches for studying Rhizobium were covered. A substantial part of the Workshop consisted of laboratory practical sessions.

3. The results obtained by participants were interesting in almost all cases. Large genotypic differences (in some cases over five-fold differences) were noted in the yield or nitrogen fixation capability of different cultivars of the same legume species. Of great interest was the fact that cultivars were found that had high yields but fixed nitrogen poorly, while it was the reverse for some others. Combining these contrasting traits through genetic selection and breeding was therefore identified as very promising for the programme, and those participants who have reached an advanced stage of the cultivar selection programme are going to embark on this aspect of research. For most others, there is need to continue with validation of the screening for genotypic variability studies until sometime later. The results in all cases are very interesting and very promising.

4. In addition to the training Workshop listed above, one trainee from Sri Lanka, Ms. B. Gunawardena, received a one year fellowship training at the IAEA Agricultural Laboratory in Seibersdorf (to September 1991) in support of the project in Sri Lanka.

5. The technical co-operation among developing countries (TCDC) aspect of the project is worth noting. Many participants exchanged useful data, Rhizobium strains and legume cultivars, not to mention the hosting of the workshop in a member's laboratory.

6. Phillipines was admitted as a new member, together with staff from ICRISAT, an International Research Institute, as a cost-free participant. Hopefully Vietnam will join in the very near future.

Thank you.

SKADanso/ct-1646

Cl: None

cc: RCS

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 Meditterrean 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 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.

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 difficulties 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
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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

Project Title: DEVELOPMENT OF STRATEGIES FOR IMPROVING ANIMAL PRODUCTION AND HEALTH IN ASIA (New Proposal)

Project Officer: B.M.A.O.Perera, Animal Production & Health Section

Background:

The IAEA, through its Department of Technical Cooperation and the Joint FAO/IAEA Division, has been supporting research and development on improving the productivity and health of livestock in Asia. This has been done mainly through individual Technical Cooperation (TC) projects and the award of Research Contracts under Coordinated Research Programmes (CRP's).

Programme goals have been focussed on solving problems which limit animal productivity in tropical and subtropical regions, with emphasis on evaluating indigenous and upgraded breeds, under traditional village-level or small-farm management systems. The objective is to devise simple, cheap and sustainable methods of improving productivity, based on changes in management, nutrition or disease control.

TC projects along these lines have been recently concluded or are on-going in the People's Republic of China, Indonesia, Republic of Korea, Malaysia, Mongolia, Philippines, Sri Lanka, Thailand and Vietnam. Institutes in all these countries as well as in Bangladesh and Pakistan have received additional assistance for specific research projects through CRP's.

Present Status:

At a recent Workshop for Counterparts of IAEA Technical Cooperation Projects on Animal Production and Health in the Asian Region held in Malaysia, it was concluded that FAO/IAEA support has enabled the establishment of immunoassay techniques, such as the RIA for measuring progesterone and ELISAs for diagnosing diseases, in many of the participating countries. Local scientists have developed the capability to use these together with traditional methods for generating research data which can be applied at the field level for enhancing productivity.

For example, supplementary feeding of ruminants, particularly dairy cows and goats, with urea-molasses-multinutrient-blocks (UMMB) has increased growth rates, milk yield and fertility of these species in several participating countries. However, feeding strategies need to be adapted for different species of animals, production systems, and the availability and cost of feed ingredients in different locations. Studies in buffaloes have shown that better fertility can be obtained simply and at no extra cost by changing management practices such as unrestricted suckling of calves. Further studies are needed, however, on the methods

which can be adopted under different farming systems, in relation to the farmer's relative priorities (draught/milk/meat) and socio-economic factors. In one project, a breakthrough was achieved in reducing the usually high mortality of young buffalo calves which occurs due to a parasitic roundworm. A single treatment with a cheap and freely available drug, administered at a strategic stage, was found to be effective. The wider applicability of this technology also needs further testing.

Future Needs in the Region:

Although considerable knowledge on methods of improving livestock production through changes in breeding, feeding, management and disease control now exists, there is a need to study their applications at the village small-farm level on a wider scale, and under varying conditions. Such studies need to be undertaken in a coordinated manner by groups of scientists in different countries and, to be effective, needs closer contact and interaction between scientists within the region.

Clearly, much expertise also exists within the region. However, this is mostly restricted to specific disciplines, and is found in a few research institutes or universities in certain countries. Harnessing this expertise to assist institutes in other countries within the region will not only be cost-effective, but will promote the concept of TCDC.

A conclusion at the recent Workshop referred to above was that one of the most important contributions of the FAO/IAEA programmes was the bringing together of research workers in developing countries to discuss their work and to learn from each other's experiences. It was recommended that this should be continued at regular intervals.

With regard to the specific techniques such as RIA and ELISA which are the cornerstone of FAO/IAEA programmes, it is essential that a strategy should be established for support of participating institutes for a period beyond the termination of TC projects, particularly for the provision of specific biological reagents and technical backstopping. The long-term objective is to develop centers of excellence within the region, with the capability to produce and supply these reagents and also provide training and technical support to other institutes.

Action has already been initiated to lay the foundation for a broad programme along the above lines. A new CRP on development of feed supplementation strategies will be launched during the first half of 1992. A regional training course on immunoassay and related techniques has been approved for funding during 1993 under the Regular TC programme. A proposal for a UNDP-funded regional project to support specific research and development in this field is also currently under consideration.

Objectives of the Project:

1. To create a network of institutes working on common problems which limit animal productivity in the region. This will include past as well as current recipients of support through IAEA TC projects and FAO/IAEA research contracts, and will provide a focus for consolidating all activities.
2. To promote interaction between scientists within the region and to initiate a program for addressing problems which are common to several countries, through a multi-center approach. This will also provide a medium for interchange of expertise, reagents and research results, and will actively promote TCDC.
3. To strengthen the capability for training younger scientists within the region, thereby contributing to development of human resources. This will improve the capability of national research systems to generate and apply the results of research for sustainable development of livestock production. Improved efficiency of production will cause fuller utilization of feed resources and will minimize the adverse effects of farming on the environment.

Participating Countries:

Bangladesh, Indonesia, Malaysia, Mongolia, Myanmar, Pakistan, People's Republic of China, Philippines, Republic of Korea, Sri Lanka, Thailand and Vietnam. The inputs will depend on specific requirements and whether or not there is a currently active project at each specific institute. The expertise available in the above developing countries, as well as in Australia, New Zealand and Japan will be utilized as far as possible.

Proposed Activities and Inputs:

	<u>1993</u>	<u>1994</u>
1. Biological reagents, kits, equipment and consumables	60,000	50,000
2. Expert services and technical support	4 m/m	3 m/m
3. Regional Training Course (approved for funding under regular programme)	+	-
4. Workshop for Chief Counterparts	-	30,000
Total	----- 100,000 -----	----- 110,000 -----

P r o s p e c t u s

<u>Title:</u>	REGIONAL (RCA) TRAINING COURSE ON COMPUTER APPLICATION ON RESEARCH REACTOR CONTROL AND CALCULATION
<u>Place:</u>	Multipurpose Reactor Center, Serpong (Jakarta), Indonesia.
<u>Date:</u>	29 November - 19 December 1991
<u>Deadline for nominations:</u>	31 July 1991.
<u>Organizers:</u>	International Atomic Energy Agency in co-operation with the Government of Indonesia through the National Atomic Energy.
<u>Language:</u>	English.
<u>Participation:</u>	The course will be open to 10 participants from developing RCA Member States in the Asia and Pacific region. Preference will be given to candidates from countries having operating research reactors or research reactor under construction.
<u>Purpose of the course:</u>	The purpose of the course is to train research reactor operation personnel in the application of personal computer versions of computer codes for reactor operations, use and management.
<u>Participants' qualifications:</u>	Candidates should have a basic knowledge of reactor physics, preferably in calculation in reactor physics.
<u>Nature of the course:</u>	The course will consist of lectures, practical exercises and experiments. The practical exercises will be performed on personal computers of the AT type. the main contents of the course are:

LECTURES AND PRACTICAL

1. Neutronic and Reactivity
 - a. Considerations in control rod calibration and maximum permissible control rod speeds (Application of POKIN and POKDYN Codes) (2 d)
 - b. Reactivity determination by inverse kinetics and fourier analysis method (Application of KINIK, INVEK and POFREF Codes) (2 d)
 - c. Neutronic and fuel element cell calculation application of ANISN and WIMS Code (2 d)
 - d. Whole core neutronic calculation (Application of CITATION Code) (2 d)
 - e. Burn-up determination and fuel management (Application of CREMAT Code) (2 d)
 - f. Reactor poisoning by Xenon/Samarium (Application of XENSAM Code) (1 d)
2. Reactor Thermohydraulics
 - a. Fluid flow and heat-transfer calculation (Application of HEATHYD Code) (1 d)
 - b. Modelling of natural convection heat-transfer (Application of NATCON Code) (1 d)

3. Transient and Safety Analysis

- a. Reactivity accidents (Application of SOTRAN and POKDYN codes) (1 d)
- b. Reactivity initiated power transients and trip setting considerations (Application of POKIN and POKDYN Codes) (1 d)

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 July 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 to make a preliminary evaluation of the candidates.

Language certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country 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 bear the full cost of the participants' air travel from their home countries to Indonesia and return. During their attendance at the course 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 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.

REGIONAL (RCA) TRAINING COURSE ON COMPUTER APPLICATION ON RESEARCH
REACTOR CONTROL AND CALCULATION, SERPONG (JAKARTA), INDONESIA,
29 NOVEMBER - 19 DECEMBER 1991

C7-RAS-4.011-003

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P r o s p e c t u s

- Title: REGIONAL (RCA) TRAINING COURSE ON NUCLEAR POWER
PRE-PROJECT ACTIVITIES AND MANPOWER DEVELOPMENT
- Place: Nuclear Training Center, Korea Atomic Energy Research
Institute (KAERI), Daejon, Republic of Korea.
- Date: 7 - 25 October 1991
- Deadline for
nominations: 10 August 1991.
- Organizers: The Government of the Republic of Korea through the Korea
Atomic Energy Research Institute in co-operation with the
International Atomic Energy Agency.
- Language: English.
- Participation: The training course will be open to 20 participants from
developing RCA Member States in the Asia and Pacific
region.
- Purpose of
the course: The purpose of the course is to provide participants with
an overview of practical elements involved in planning and
implementation of a nuclear power project with emphasis on
nuclear power pre-project activities and management of
nuclear power project.
- Participants'
qualifications: Candidates should be senior or middle management
professionals who work for Governmental authorities or
utilities responsible for nuclear energy matters and
national industry. Participants should be individuals who
are participating in a nuclear power project, and who will
be involved in the planning and implementation of a
nuclear power project. They should have a university
education in science, engineering, economics or management
and 3 - 5 years of related experience. Prior basic
knowledge of nuclear technology and engineering would be
helpful.
- Nature of
the course: The training course will comprise lectures, panel
discussions, small group workshops and demonstrations on
full scale nuclear and compact nuclear simulators. A
scientific visit to a nuclear power plant will also be
included.
- Outline of
the course: The following areas will be covered:
- overview of a nuclear power project
 - nuclear policy, pre-project activities and feasibility
study
 - siting and environmental surveys
 - public relations and public acceptance
 - manpower development
 - bid preparations
 - evaluation of bid documents
 - contracting
 - technology transfer
 - design and engineering

- quality assurance/quality control
- safety analysis, licensing and regulations
- construction and its management
- nuclear fuel
- demonstration on a compact nuclear simulator and
- scientific visits (NPP and other sites)

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 10 August 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 to make a preliminary evaluation of the candidates.

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

Mr. PH Choi
Co-ordinator
Korea Atomic Energy Research Institute
P.O. Box 7, Daeduk-Danji
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Republic of Korea

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Fax: (042) 820-270250

Language
certificate:

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

Administrative
and financial
arrangements:

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

The Government of the Republic of Korea will, out of its contribution to RCA, defray the costs of the participant's air travel from their home countries to Seoul and back, as well as a stipend sufficient to cover the costs of their accommodation, meals and incidental expenses.

The organizers of the course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the 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 NUCLEAR POWER PRE-PROJECT
ACTIVITIES AND MANPOWER DEVELOPMENT, DAEJON, REPUBLIC OF KOREA,
7 - 25 OCTOBER 1991

C7-RAS-0.015-006

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NUCLEAR TECHNIQUES IN DEVELOPMENT OF ADVANCED CERAMIC TECHNOLOGIES

Introduction:

The shift from traditional to high technology-based industries relies on advanced materials. The development and application of better functional materials have their impact not only on economic, but also on environmental issues. Products made from high durability materials have a longer life cycle, producing less waste and effecting lower overall energy investment. Similar advantages are gained when using miniaturized systems. For example, engines made from high temperature resistance materials assure better efficiency of burning thereby decreasing both fuel consumption and flue gas formation. Parasitic heat production will decrease if electricity can be transferred by superconductors.

The importance of the development and application of advanced materials is well understood by all developed and many developing countries. In the Asia region alone countries like: China, Pakistan, India, Singapore, Republic of Korea are involved in advanced materials programme. The U.S.A. for instance is doubling its \$ 1.4 billion expenditure on materials research in the next year.

The development as well as the reliable and efficient processing of new materials relies strongly on their characterization. Many physical, chemical and optical methods are in use, the selection of a technique being dependent on the kind of information required and on the available equipment. Nuclear methods, specifically neutron diffraction and scattering, have proved very fruitful in investigating structural properties of complex materials. The performance of advanced ceramics is dependent on their structure, chemistry and electronic configuration. High temperature superconductors exhibit wide compositional fluctuations and oxygen disorder effects as a result of aging, method of fabrication and other conditions. Those structural changes that affect their electrical properties can only be observed by neutron techniques. Outside superconductor research, the variety of materials studies by neutron diffraction and scattering is equally impressive including zeolites, fast ionic conductors, permanent magnets, porous materials, materials undergoing phase transitions, residual bulk stress analysis, ordering and phase separation in alloys and multilayer structures.

Neutron diffraction and scattering.

Beams of electromagnetic radiation, electrons or other charged particles, which are used as probes, the most popular in materials sciences being:

- Proton Induced X-ray Emission (PIXE)
- Rutherford Backscattering Spectroscopy (RBS) used mainly to analyze thin layers of heavy elements
- Channelling Technique to trace lattice damage and foreign atom location,

Transmission Electron Microscopy (TEM).

All those methods interact, primarily with electrons and are therefore confined to the sample surface. Neutrons can penetrate deeply into most materials thus probing their bulk properties. As a probe of materials, neutron scattering suffers from a number of limitations: it is expensive; non-portable; and, signal-limited. The method is used only when it provides information which cannot be obtained by other means. However, the use of neutron techniques has increased dramatically in recent years due to the development of advanced neutron sources, instrumentation, and improved data analyses. The discovery of YBa₂Cu₃O₇ for example was quickly followed by several X-ray determinations of the cation position; however, because of twinning problems and the relatively weak oxygen scattering, X-rays were unable to establish accurately the oxygen stoichiometry and location in the compound. This information, which is vital to a proper understanding of this materials, came only as a result of neutron powder diffraction studies. In addition materials scientists and technologists are finding that the great penetration depth, non-destructive nature of neutrons, their ability to probe materials not only under ambient conditions but also at high and low temperatures and pressures, are also making them indispensable in the structural characterizing of materials on a more macroscopic scale using small angle scattering (SANS) techniques. Grain boundary cavitation, whereby small voids develop and accumulate at grain boundaries of materials subjected to deformation at elevated temperatures, is an important and poorly understood damage mechanism in high temperature materials currently being used. The type of information needed to understand this phenomenon includes the bulk distribution of the size and the number of voids. Transformation toughened zirconia represents another example where this kind of knowledge is essential. Another use of neutron scattering in the study of materials is the measurement of bulk residual stress. Other methods commonly employed, e.g., strain gauges or ultrasonics, are either destructive or strongly affected by sample texture. The ability to reliably measure the distribution of internal stress is vital to the safe and effective design of parts made from composite ceramics or metals.

The Agency's role.

The International Atomic Energy Agency, through the Industrial Applications and Chemistry Section, has been assisting in and co-ordinating the use of nuclear diagnostic methods in medicine, industrial processes and non-destructive testing of materials. It is proposed to widen the activities to include the field of advanced materials. This field is especially suitable for Regional Co-operation. The attraction lies in the possibility of sharing a variety of equipment and experience. A strong collaboration for example exists already among the members of European Community within the European Material Research Society (EMRS) and world wide within the International Union of MRS. RCA countries region having a suitable working neutron sources, equipment for neutron diffraction or scattering; or accelerators of charged particles as well as ongoing activity in the advanced materials research and technology are potential participants in this programme. Also countries that do not have all or part of the requirements but are planning for future activities in the field of application of nuclear techniques

for advanced materials development and processing could find this programme useful. It is believed that the following objectives would be met:

- i) Exposure of RCA Region's Material scientists to "hands on" experience with the wide variety of equipment available regionally.
- ii) Enable appreciation of new approaches and extension of experience in advanced nuclear techniques for better evaluation and managerial decisions on future technological programmes and possible purchases of equipment for economic benefit of the countries.
- iii) Intercomparison of experimental results within a common field of interest.
- iv) Promotion of co-operation among interdisciplinary groups through the project by showing the potential of neutron techniques in material development and quality control by exploiting the existing research reactors and equipment.

Preliminary scope of the programme.

(Finalization and priorities will be done after Consultant's Meeting recommendation in October 1991).

a. Workshops:

- Use of neutron diffraction for correlation of processing parameters and ceramics performance
- Characterization of transformation toughened zirconia
- Uniformity of oxygen stoichiometry in big ceramic objects produced by melt or HIP processes.

b. Training courses on:

- Techniques available for materials characterization
- Neutron diffraction their basis equipment, data processing
- Small Angle Scattering: a) cold neutron sources, b) application to ceramic materials

- Ion beam techniques
 - Advanced data evaluation and processing.
- c. Fellowships
- d. Co-ordinated Research Programmes.

Proposed duration of the programme is 5 years, 1992-96

Scope for 1992:

- a. Expert's review for assessment the existing status in the Region and recommendation of activities to be done
- b. Establishment of Co-ordination Network
- c. National Training Courses or National Seminars
- d. Regional Training Courses.

Funding

Agency and extra-budgetary funding would be sought for activities in the period 1993/94 and 1995/96. The CRP(s) funds are expected to come from the regular RIPC budget.

Subject: Proposal for RCA Proposal
 Accelerator Based Technologies

Technical Officer:

V. Valkovic

1. Background information

Particle accelerators, conceived in the 1930's, developed in 1940's, have contributed significantly to our understanding of physics laws and structure of the matter in 1950's and 1960's. Today they and their products are used in almost all branches of high technology and modern medicine. By many considered complicated instruments these simple devices are being used mainly in developed part of the world, making the gap to its underdeveloped part even bigger.

Let us describe some of the applications of particle accelerators, in order to illustrate their possible role in science and technology transfer. First, medical applications of accelerators which include: the use of nuclear analytical methods and procedures for laboratory studies and routine measurements; material productions and modifications to meet special requirements; radioisotope productions and their applications in radiopharmaceuticals as well as in positron emission tomography; and radiotherapy with ions, based on improved understanding of the interaction of charged particles with living tissue.

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Charged particle beams can be used in medical institutions for both diagnostics and therapeutical applications. Diagnostic applications include the use of nuclear analytical techniques for element analysis, the use of different radioisotopes and especially the use of positron emitters. Therapeutical applications are not limited only to radio-therapy, but also include a broad spectrum of other activities (from the use of special materials to performing surgery).

Let us remember that two-thirds of all radioactive nuclei were discovered via accelerator induced reactions. Perhaps in no other area has accelerators development had such a marked impact on mankind as in nuclear medicine and in radiation therapy. Radioisotopes used for diagnostic purposes include ^{137}I , ^{57}Co , ^{51}Cr , ^{60}Co , ^{59}Fe , ^{68}Ga , ^{72}As , ^{82}Rb , $^{83\text{m}}\text{Kr}$, ^{123}I , ^{172}Lu , ^{44}Sc , ^{42}K . Some of the useful radioisotopes can be produced only with special beams (like tritons or π).

Positron emission tomography is based on the fact that the activity distribution within a cross section of an object can be reconstructed from the measurements of its projections. A large number of short lived positron emitters can be produced by accelerators (usually a cyclotron). However, for research and clinical studies in a hospital environment the most often needed are positron-emitting radionuclides of carbon, nitrogen, oxygen and fluorine.

The use of accelerators in material modification and subsequent analysis has been a fast growing area of accelerator based technologies. Numerous are applications of ion implantation technology which have been transformed from the research laboratories to the industry. One of the outstanding examples is the development of ion implantation for improving the wear resistance of artificial prostheses. The utility of a surgical alloy for use in artificial joints is a function of its strength, biocompatibility, and corrosive wear resistance. Ion implantation technology developed at research laboratories dramatically increased the wear resistance on an otherwise highly suitable Ti alloy. Ion implantation is now being used on approximately 20% of the artificial hips and knees sold in the United States.

Advances in radiobiology brought the understanding of processes taking place during the irradiation of living matter. This has resulted in the use of radiation as a cure of many different tumors. Gamma and X-ray radiotherapy is nowadays common practice. It should be mentioned that heavy ion beams exhibit a favourable depth dose distribution for tumor therapy compared to conventional radiation like γ or X-rays. However, the Bragg peak therapy of cancer patients with protons and heavier charged particles requires a very careful treatment planning involving the precise localization of the peak on a tumor volume.

The unique capabilities of accelerator based nuclear analytical methods have been applied to a variety of problems. When a sample of any type of material (biological, environmental, geological, metallurgical, etc.) is bombarded by beam of charged particle number of atomic and nuclear processes take place. All of these processes can be used to obtain analytical information about the sample investigated, provided that one understands the underlying physics. Some of them have been developed into accepted analytical techniques, for example the use of nuclear resonant reactions (NRR),

backscattering (RBS), production of characteristic X-rays (PIXE), proton elastic scattering analysis (PESA), coincidence measurements and time-of-flight measurements of atoms and molecular fragments.

By proper combination of detection of reaction products, one can obtain information on total elemental composition related to the morphology of sample (optical information). In addition to concentration levels, elemental concentration profiles and maps can be measured down to one micrometer spot size, with a sensitivity better than one part per million (1 ppm). This is a new, powerful analytical tool - "nuclear microscope", enabling studies such as metabolic processes in the individual cells or impurity atom locations in crystal lattice.

Another method which should be mentioned is the so-called thin layer activation analysis. This technique is used for the study of wear rates of certain material surfaces and it includes the ion bombardment of surfaces like iron or chromium with beams of proton, deuteron, or alpha particles, producing radioactive isotopes. Because these radioisotopes are produced in a very thin surface layer, the wearing away of this layer can be monitored by their decay. The method is known as thin layer activation analysis. Thin layer activation represents production of radioisotopes (in concentrations 1 in 10^{10}) with well defined depth distribution in the near surface of materials. This represents surface labelling in the μm -mm range, and it is applied to accurate measurements of wear, corrosion and erosion loss.

Ion implantation technology has grown over the past few decades to a worldwide enterprise of several billion dollars per year. This includes sales of accelerator equipment and services and the value-added during the processing of a wide variety of materials and devices. The production of virtually all microelectronic devices involves several ion implantation steps, and ion implantation technology is making rapid inroads in the processing of materials for special wear and corrosive environment. New applications for ion implantation are actively being developed, particularly at very low and high (MeV) energies.

MeV ion beam processing of semiconductors has attracted more and more attention in recent years since it can provide very promising methods for material property modification and three-dimensional device fabrication. It has been found that MeV ion implantation has many potential applications in III-V compound semiconductor technology, including the formation of buried layered heterostructures, and modification of electrical and optical properties of deep layers or interfaces.

A fairly recently development in the use of accelerator based technologies has been the combination of coating and ion implantation technologies, broadly known as ion assisted coating (IAC). Ion assisted coating promises to combine the best of both methods as a singularly effective means of engineering the surface properties of a very wide variety of materials. This technique permits the development of a new type of coating with advantages over both standard coating and implants.

Let us mention other cases of using ion beams to modify materials. For example, the technique of ion implantation has played an important role in several recent experiments on high- T_c superconducting thin films and crystals. Ion implantation is used to selectively destroy the superconductivity in superconducting oxide thin films in order to produce quantum interference devices (SQUIDS).

In conclusion, charged particle beams are assuming an ever-more- prominent role in everyday life. For example, today it is difficult to envision a research center in biomedical sciences or a contemporary hospital without the access to a particle accelerator. With future development in technology and our better understanding of charged particle interaction with living matter the role of accelerators in life sciences will increase even more. Equally important are studies of new materials and applications of unique analytical capabilities of nuclear probes to problems, like the study of global change and the greenhouse effect, the study of environmental problems, like air pollution and soil erosion, and new materials.

The developing countries that will become involved in this regional project can be sorted in three categories:

1. Countries that have an accelerator and have received TC support (Bangladesh, Singapore)
2. Countries with accelerators that will profit by training opportunities and technology/methodology transfer (India, Republic of Korea, China)
3. Countries with no suitable accelerators but need access to such facilities (Thailand, Malaysia, Sri Lanka, Phillippines, Indonesia, Pakistan)

Developed countries in the area (Japan, Australia) all have many accelerator facilities covering almost all fields of applications.

2. Objectives

The primary objective of the proposed project is to promote the use of low-energy ion accelerators to:

- (i) medical applications (radiopharmaceutical manufacturing plant, PET center);
- (ii) industrial applications (new material production, modification and analysis);
- (iii) research and development (use of accelerator based nuclear analytical techniques).

3. Activities

Proposed project duration: 1993-1997

Tasks planned for 1993 - 1994:

(i) Project formulation meeting

(ii) Workshop:

Accelerator based technology transfer to developing countries

Output

TECDOC having a list of available facilities and manpower in developing countries in the area; description of accelerator based techniques appropriate for technology transfer to developing countries; list of problems in developing countries which might be attacked.

(iii) Workshop:

Safety regulations on small accelerators

(iv) Advisory Group Meeting:

Accelerator based technologies in industry

Output:

TECDOC summarizing in a critical and analytical way the state of art in the field.

(v) Workshop series including:

- (a) the use of nuclear analytical methods and procedures for laboratory studies and routine measurements;
- (b) material production and modifications to meet special requirements;
- (c) radioisotope productions and their applications in radiopharmaceutical manufacturing as well as positron emission tomography;
- (d) radiotherapy with ions.

Output:

A series of TECDOC's summarizing the recent advances in these fields.

(vi) Intercalibration exercise on selected accelerator based analytical techniques and with selected materials.

(vii) CRP on medical uses of cyclotrons

(viii) CRP on accelerator mass spectrometry and its applications

(ix) CRP on production, modification and analyses of new materials by charged particle accelerators

4. Budget Forecast

1993	(i)	workshop	\$	25,000.-
	(ii)	workshop	\$	25,000.-
	(iii)	AGM	\$	25,000.-
	(v)	Materials and spare parts required for intercalibration exercise	\$	25,000.-
	(vii)	CRP	\$	40,000.-
	(viii)	CRP	\$	40,000.-
	(ix)	CRP	\$	60,000.-

		TOTAL	\$	240,000.-
1994	(iv)	workshop series (a),(b),(c),(d)	\$	100,000.-
	(vi)	intercalibration exercise	\$	25,000.-
	(vii)	CRP	\$	45,000.-
	(viii)	CRP	\$	60,000.-
	(ix)	CRP	\$	70,000.-

		TOTAL	\$	300,000.-

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Fifth Technical Session on Radiation Protection

Opening Address by Project Committee Chairman, Dr. S. Kobayashi

Distinguished representatives from IAEA, distinguished delegates from Member States, distinguished observers from Mongolia, ladies and gentlemen,

It is my great honour and pleasure to serve as the Chairman for Project Committee of Radiation Protection Project which is now constituted according to Article VI of the R.C.A. Agreement.

Before starting discussion on the items listed in the Agenda, I would like to describe briefly some unique features of Radiation Protection Projects as follows:

1. All the RCA Member States actively participate in and contribute to the effective implementation of the Project by exchanging experts and lecturers, collecting and analyzing relevant data, or by hosting TCs, WSs, or RCMs, among others.
2. All the possible means, i.e., TC, WS, RCM, Expert exchange, etc., are mobilized in a concerted manner to attain a specified objective.
3. Training Courses or Workshops to strengthen radiation protection infrastructure are convened every year in Australia, China, India and Japan, each of which is participated by almost all Member States.
4. It has research component by which research capability of participating Member State is developed; Although presently there is only one CRP due to financial constraint (Reference Asian Man), other program activities such as those on personal dosimeter intercomparison program contain research element of essential needs.
5. The project is reviewed every year by Expert Advisory Group Meeting in order to evaluate the performance of the project of the year and to recommend on the program activity for the following year. The Summary Report of the 1991 EAGM is distributed herewith for your information.

If you would kindly bear with me for a few more minutes, I would like to quote some significant phrases of concluding remarks of 1991 EAGM as follows:

"It is noted with great pleasure that the enhanced attention put by the Agency on radiation protection, good support by all the governments toward upgrading practices and the significant support of Member States through the RCA programme, contributed to the increased level of radiation protection in the region. However, the situation can still be described as heterogeneous over the Region as to the levels and effectiveness of radiation protection, although the progress made by each Member States, such as China, Malaysia, Indonesia, Viet Nam and others is noteworthy and is respected greatly. These countries should be encouraged to continue in that direction and, when needed, assisted in their efforts".

"Special attention should be given to the few Member States which still have not promulgated a national law on radiation protection. Without a regulated use of ionizing radiation, one cannot expect any progress in applying radiation protection measures. Radiation protection is an interdisciplinary issue with transboundary effects; and therefore, the non-regulated use of radiation sources slows down the general level of radiation protection in the region".

"It is our feeling that the RCA radiation protection programme is now at a turning point. When created in 1987, the programme was strongly influenced by the Chernobyl accident and its radiological consequences. The needs of a large number of countries were focussed on establishing a good radiometric control of domestic and imported foodstuff, in establishing derived intervention levels for contaminated food, and in organizing an early warning system to detect possible contamination. To this aim, countries had to have a good and operational radiation protection infrastructure. Therefore, the highest priority was given to strengthening national infrastructures. The organization of training courses and workshops, as well as a successful exercise on intercomparison of personnel dosimeters, contributed greatly to attain these objectives".

"By analyzing the achievements obtained so far, and the impact of RCA activities on the radiation protection practices in Asian countries, one can conclude that the programme has been successful and of benefit to all the participating countries".

"In the aftermath of the Chernobyl accident, national laboratories for food contamination control were established in practically all Member States of the Asian region. Keeping these situations in mind, we should now analyze the present situation and the needs of Asian countries in an unbiased way, and revitalize the RCA programme with new input for this purpose".

"Project Formulation Meeting for Phase II of Radiation Protection Project is planned to be convened this year to deliberate and recommend future RCA activities in radiation protection, and shape its programme for the coming 2-3 years. The Project Formulation Meeting for Phase II will be held in Tokai, Japan, in June this year, and every Member State is cordially invited to participate".

Examples of possible subjects to be discussed at the coming Project Formulation Meeting are given below as cited from the list of possible subjects recorded in the last EAGM Report with some additions taking into consideration the discussions made during the Second Technical Session yesterday.

- (1) Internal personnel dosimetry
- (2) Natural and man-enhanced radioactivity
- (3) Radiation protection aspects of decommissioning
- (4) Research reactors
- (5) Training of personnel
- (6) Impact of the new ICRP recommendations on the radiation protection practices
- (7) Biological effects of low-level, low dose-rate ionizing radiation
- (8) Public acceptance aspects of radiation

**IAEA-RCA PROJECT
STRENGTHENING OF RADIATION PROTECTION
INFRASTRUCTURES**

**REPORT OF IAEA-RCA
EXPERT ADVISORY GROUP MEETING ON
PROGRAMME ACTIVITIES FOR 1992-1993**

DECEMBER 3 - 4, 1991

**CONFERENCE ROOM No. 901
9th FLOOR, KOHKUH KAIKAN (AVIATION BUILDING)
SHINBASHI, TOKYO
JAPAN**

CONTENTS

A. Report of the Meeting	
I. Opening of the Meeting	1
II. Review of Activities for 1990-1991	2
(1) Overview	
(2) Reviews from Japan	
(2) - 1. Training Course in Japan, 1991	
(2) - 2. Personal Dosimeter Intercomparison Program	
(2) - 3. Review of Coordinated Research Program : Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man	
(3) Review of Activities from China	
III. Future Program Activity	4
(1) Proposal from Japan	
(1) - 1. Plan of IAEA/RCA Personal Dosemeter Intercomparison and Workshop in 1992	
(1) - 2. Coordinated Research Program : Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man	
(1) - 3. Training Course	
(1) - 4. Project Formulation/Review Meeting for Radiation Protection Project and Radiation Protection Regional Training Courses	
(2) Proposal from Australia	
(3) Proposal from China	
(4) Other Relevant Activities	
IV. Conclusion	7
Observations	
Conclusions and Recommendations	
Actions	
Table 1	
Table 2	
B. Appendices	
Presentation Text	
List of References	
Agenda of the Meeting	
List of Participants	

Report of the Meeting

The IAEA-RCA Expert Advisory Group Meeting on Radiation Protection Project was convened on December 3-4, 1991 at the Conference Room No. 901 of Kohkuh Kaikan in Tokyo. The Meeting was attended by 18 experts, i.e., one each from Australia, Dr. Woods, China, Dr. Wang, India, Dr. Iyengar, and 13 from Japan as well as two officers from IAEA, Dr. Strohal, the Project officer in charge, and Dr. Easey, RCA Coordinator.

The Meeting firstly reviewed the program activities carried out in 1990 and 1991 in Australia, India, China and Japan according to the procedures set out in the Project Document [Appendices C-1-1 to C-3]. It then discussed the programs to be implemented in 1992 and onwards as proposed by Australia, India, China and Japan in the light of its effectiveness in upgrading radiation protection in RCA Member States.

The proposed plans, some are new and some are follow up activities of previous years, are identified and detailed with regard to the timing of meeting and the target category and level of participants [Table 1. and Appendices D-1-1 to D-3].

It is recognized by the Meeting that there are many more subject areas of importance which need to be dealt with but have been left for future action due to financial and technical support limitations. These include, for example, radiation protection in medical practice, medical aspects of over exposure, emergency preparedness and personal dosimetry at accident situations and offsite emergency preparedness. These are expected to be considered in the second phase of this Project starting in 1993 (Table 2.).

The following is a resume of the discussions and the conclusions of the meeting.

I. Opening of the Meeting

Dr. P. Strohal opened the meeting on behalf of IAEA, and proposed that the Meeting be chaired by Dr. S. Kobayashi, NIRS, Japan which was so accepted. Opening addresses were delivered

by Dr. J. Easey on behalf of IAEA, and by Mr. Wada of Ministry of Foreign Affairs and Mr. Soyama of Science and Technology Agency on behalf of the Government of Japan. In these addresses, importance of radiation protection was stressed and there were strong expectations that the RCA Radiation Protection Project would fulfill the needs of the Region. Appreciation was expressed for the active cooperation of Member States and of the experts participating in the Meeting.

II. Review of Activities for 1990-1991

(1) Overview

Dr. Easey, RCA Coordinator outlined the whole activity of RCA starting with its history, the objectives, on-going programs and the achievements. He emphasized the needs for more active participation of Member States in providing resources in developing the program activity in response to the requirements [Appendix A]. Dr. Strohal presented an overview of the radiation protection developments and needs in Asia. In addition he emphasized that the RCA program on radiation protection has been successful and of benefit to all the participating countries. In the aftermath of the Chernobyl accident the program was tailored to help the Asian countries in establishing the necessary radiation protective measures and to build-up an infrastructure to implement these measures. Today the region may have other priority in the area of radiation protection and we are expected to meet them. Safe use of ionizing radiation in medical, industrial and other applications continues to be a task of the highest priority in radiation protection. Training in these areas is therefore an activity which needs to be continued. The other relevant factor which will influence future activities of the project are recently published ICRP recommendation which - when applied - will have strong influence on the radiation protection practices, and also on nuclear industry and new designs of relevant installations. Keeping in mind that radiation protection is an interdisciplinary activity and that radiation can have (negative) transboundary effects, these topics should continue to be of high priority concern for RCA

participating countries. Several suggestions regarding topics which can be considered as future activities within this project were made [Appendix B].

(2) Reviews from Japan

(2)-1. Training Course in Japan, 1991

Mr. Sakurai and Mr. Ninomiya (PNC, Japan) reported on the results of Training Course on "Basic Technique of Radiation Protection" held in Japan in October 1991.

The purpose of the course was to train personnel in radiation protection, putting emphasis on theory and techniques for measurement, calibration, maintenance and radiation control system in nuclear or radiation facilities. The course was attended by 12 participants from 10 countries, 1 lecture from India.

The course consisted of 3 days lectures, 6 days practical exercises and technical tour to the Instrument Division of Hitachi Ltd., and was well received by all participants especially for the practical exercises [Appendix C-1-1].

A comment was made on the need to ensure proper selection of the candidates for the training course.

(2)-2. Personal Dosimeter Intercomparison Program

Personal dosimeter intercomparison program, phase 2 has been carried out since May, 1991 [Appendix C-1-2]. This program consists of two sub-programs such as 1) Field reference value check and 2) Second phase of personal dosimeter intercomparison. The field reference value check, which is to compare reference dose value of calibration source of each participant's laboratory, was completed in August, 1991. Twelve participants of 11 different RCA member states participated in this sub-program and it provided a good opportunity for the participants to re-check their calibration fields and techniques. Second personal dosimeter intercomparison is now being done as the other sub-program of RCA activity in 1991. This intercomparison is carried out in the same way as that of 1st phase in 1990, and improved results are expected.

(2)-3. Review of Coordinated Research Program: Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man

Accomplishments at the second RCM, Bombay, 8-12 April, 1991 was reviewed by Dr. Kawamura, Japan [Appendix C-1-3]. The necessity for promoting the CRP in several participating countries where progress was limited, was pointed out by IAEA, noting the significance of data for a reference Asian Man. Individual papers were distributed by India [Appendices C-2-1 to C-2-3]. The status in China was reviewed in detail [Appendix C-3].

It was pointed out that as a means of effectively processing the CRP, only participants making significant scientific contribution should be involved in this program. On the other hand it was considered essential that this CRP should be implemented so as to produce Representative data for all Asia.

(3) Review of Activities from China

Dr. Wang described the results of "Regional Training Course on Environmental Monitoring and Assessment of Nuclear Facility", held on 14-24 October 1991 in Taiyuan. The course was attended by 8 participants from 5 RCA member states and 15 local auditors. It produced a quite positive response.

The research activity on CRP on "Reference Asian Man" was reported to be advancing quite satisfactorily with some components surpassing the planned goal of the CRP. Intercomparison Program on personal dosimeter was progressed as planned.

III. Future Program Activity

(1) Proposals from Japan

(1)-1. Plan of IAEA/RCA Personal Dosimeter Intercomparison and Workshop in 1992

Dr. Minami proposed final phase activity on "Personal Dosimeter Intercomparison " and a workshop on personal dosimetry, which will be conducted in 1992 [Appendix D-1-1]. The intercomparison exercises are designed to check the performance of dosimetry systems on new ICRU quantity as well as exposure.

In 1992, a workshop will be also held to discuss overall intercomparison results and another subjects concerning the personal dosimetry in RCA member states to conclude past 5-years activity.

(1)-2. Coordinated Research Program: Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man

Collection, evaluation and compilation of data will be continued during 1992 (and 1993) on (i) physical and anatomical parameters, (ii) food consumption and intake of elements, and (iii) pulmonary function and water balance with priorities indicated in the latest RCM. It was confirmed that third and final research co-ordination meeting will be held during 1993. An additional expert advisory meeting was proposed outside the CRP budget if necessary, to discuss how to approach to setting of a Reference Asian Man before the RCM. Japan will be a candidate as hosting country for this meeting.

The result of the current CRP will be published as an IAEA technical document as currently planned. For future plans after 1993, CRP of phase II, a workshop or a training course were proposed [Appendices C-1-3,C-3]. Emphasis may be put on parameters for biokinetics of elements and radionuclides relevant to internal dose assessment.

It was pointed out again that only participants making significant scientific contribution should be involved in this program.

(1)-3. Training Course

Dr. Minami explained that two training courses scheduled in the present project have been implemented already and no new proposal is programmed for 1992. He suggested that training courses in the future after 1993 would be prepared and implemented by the training school of JAERI.

Dr. Tominaga proposed a training course on Radiological Emergency Preparedness which would be scheduled possibly twice in the second half of the next 5 years project. He explained that the JAERI training school would also have some possibilities

to conduct other kinds of training courses in the field of radiation protection.

A suggestion was made to perform training courses of advanced level in Japan for medical doctors and/or paramedical staff. A training course was also indicated as for this future program on radiation protection in the area of industrial application in relation to the new UNDP-Industrial Application Project.

(1)-4. Project Formulation/Review Meeting for Radiation Protection Project and Radiation Protection Regional Training Courses

The second IAEA/RCA Radiation Protection Project Formulation/Review Meeting for 2nd phase of Strengthening Radiation Protection Project in June 1992 and a Workshop on Intercomparison of Personal Dosimeter in October, 1992 at Tokai, Japan.

(2) Proposal from Australia

a) IAEA/RCA workshop on the Development of Training Techniques and Method of Instruction in Radiation Protection.

Mr. Woods (Australia) presented the prospectus, pre-course instructions for participants and draft timetable [Appendix D-2-2] for this workshop which will take place 17-28 February 1992.

He detailed the components of the workshop and emphasized the desire that a specialist trainer with radiation protection expertise from each of the 14 countries, including Japan, should attend and that all countries irrespective of their level of development in radiation protection would benefit from the discussions on standard radiation protection syllabi and radiation protection training requirements.

The workshop details were supported by the meeting.

b) Australian proposal for an IAEA/RCA project on the Applications of Isotope and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine, 1992-1996.

Mr. Woods (Australia) presented the radiation protection aspects of the above proposal. Radiation Protection Training will be included in support of Industrial Applications Seminars

proposed for member countries. In addition, high quality training manuals and a distance learning program in radiation protection will be developed in 1992/1993. A workshop on distance learning is proposed for 1993/1994, followed by the implementation of the program and some in-country training and assessment of the success of the program in 1993/1994 [Appendix D-2-1].

(3) Proposal from China

Dr. Wang (China) detailed the ongoing contribution from China on reference Asian Man. China was complimented on the extensive work done so far on this project.

In his presentation, Dr. Wang suggested that a workshop on statistics and measurement methods used in the Reference Man project would be of benefit. He also suggested that IAEA should consider the development of an Asian phantom.

Dr. Wang outlined a proposal for a new CRP on Comparative Studies of the Environmental and Health Impacts of Nuclear and Coal Fuel Cycles. Dr. Easey highlighted the financial constraints relating to new CRP projects and suggested other funding possibilities for consideration.

The following training courses were proposed:

1. Regional Training course on the "Safe Application and Control of Irradiation Facilities", Beijing, May 1993.
2. Regional Training Course on ICRP Publ. 60.

These proposals from Dr. Wang were well received, however, the question of funding was again raised.

Dr. Wang invited the next Expert Advisory Group Meeting to be held in Beijing.

(4) Other Relevant Activities

As other relevant activities, enthusiastic discussion was made on the new ICRP recommendation, Publication 60, especially with regard to its implications for the protection of public and the problems in its implementation in the Region.

IV. Conclusion

The meeting endorsed the proposed program of activities listed in the Table 1 for implementation in 1992 and 1993. The

timings of these activities could be subject to modification following consultations with the relevant organizations of the Member States and the Secretariat of IAEA. Among the program activities listed in the Table 1, there are two meetings of special note, namely,

- 1) Project Formulation Meeting for the Second Phase of Strengthening of Radiation Protection Infrastructures Project, and
- 2) 1993 Expert Advisory Group Meeting in 1992.

It was recommended that the Project Formulation Meeting on Radiation Protection Project for the Second Phase should be held in Tokai, in late June 1992. The timing of this meeting was so selected that the results of the meeting be effectively and timely reflected to the administrative preparation by the Governments and IAEA offices concerned for the initiation of phase II project in 1993.

The Expert Advisory Group Meeting on 'Strengthening of Radiation Protection Infrastructures' Project was agreed to be scheduled in November 1992 for the final review of the phase I and to make plans and coordination for the first year of phase II project. The Meeting accepted with gratitude the invitation from the People's Republic of China to host this meeting in Beijing.

The meeting made the following specific observations, conclusions and recommendations.

Observations

- 1) The Meeting was encouraged by the visible upgrading of radiation protection levels within the Asia-Pacific Region. Much of this gain is directly attributable to the inputs from this Project.
- 2) It was also noted with satisfaction that there was a marked increase in bilateral activities between some Member States and that the TCDC component was strongly supported through the direct support given by the Governments of China and India.

- 3) The Meeting noted the strong technical and financial support given to the Project by the Governments of Australia, China, India and Japan, and encouraged other RCA Member States to maximize their support for this Project.
- 4) The Meeting expressed concern that Bangladesh and Sri Lanka have not promulgated radiation protection legislation and urged them to implement this as soon as possible.

Conclusions and Recommendations

- 1) The Meeting recommended that the IAEA should give priority on the 'RCA footnote a Radiation Protection Infrastructures Project RAS/9/006' and assist the development of the Project by providing supplementary funding for 1992 activities.
- 2) The Meeting endorsed the view of the UNDP mid-term evaluation of the UNDP Industrial Project RAS/86/073 that additional emphasis on radiation protection and safety issues is necessary to further the transfer of nuclear technology into regional industries.
- 3) The Meeting noted the inclusion of radiation protection and safety as elements in the new project proposal to UNDP for the 5th Intercountry Program Cycle entitled "The use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development".
- 4) The Meeting welcomed and supported the radiation protection component in the new Australian proposal for an RCA project entitled "The Application of Isotope and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine".
- 5) The Meeting strongly reaffirmed the need for convening in 1992, a Project Formulation Meeting for a 2nd phase of the "Strengthening of Radiation Protection Infrastructures Project. This was a recommendation of the previous Expert Advisory Group Meeting in 1990.
- 6) The Meeting suggested a list of subjects as illustrated in Table 2 for possible inclusion as new components in the Project which will be considered at the forthcoming Project

Formulation Meeting for Phase II.

- 7) The Meeting reviewed the current training activities for the Project and recommended that additional emphasis on training was required, especially because of the recent developments in the international recommendations affecting radiation protection policy.
- 8) The Meeting emphasized the need for high calibre appropriate candidates for training events and noted the need for Member States to correctly choose potential participants based on the need for sustainability of the technology.
- 9) The Meeting noted that Member States should make full use of the extensive IAEA resources in publications, videos and films to assist in the development of the Project.
- 10) The Meeting agreed with the need to inform and update Government decision makers, politicians and administrators on the purpose and the achievements of the Project in order to maintain the profile and the priorities. The IAEA was requested to support such initiatives.
- 11) The Meeting requested the IAEA to take note of the priorities assigned by the Expert Advisory Group Meeting to the specific components in this Radiation Protection Infrastructures Project when programming future events.

Actions

With regard to the conclusion and recommendation given above, the Meeting requested the RCA Coordinator to implement actions specified as follows:

- 1) The RCA Coordinator was asked to seek the required additional project funds from IAEA for the implementation of the 1992 activities once the current budgetary position was clarified.
- 2) The RCA Coordinator was asked to circulate the finalized program of activities for 1992 to the Project Counterparts.
- 3) The RCA Coordinator was asked to supply information on the yearly reporting of Coordinated Research Program activities

and the procedures governing the renewal of contracts and agreements for CRPs.

- 4) The RCA Coordinator was asked to ensure coordination of the Strengthening of Radiation Protection Infrastructures Project with the associated activities in the new industrial application project proposed before UNDP as well as with any other relevant program activities of IAEA.

Table 1

A. Proposal of Program Activities for 1992

	Title	Country	Proposed Dates & Period	Level
1)	IAEA/RCA Workshop on the Development of Training Techniques and Methods of Instruction in Radiation Protection	Australia	17-28, February	High
2)	The IAEA/RCA Radiation Protection Project Formulation Meeting for 2nd phase of Strengthening Radiation Protection Infrastructures Project	Japan	Late June	High
3)	IAEA/RCA Personal dosimeter Intercomparison Exercise	Japan	April - September	Middle
4)	IAEA/RCA Workshop on Personal Dosimeter Intercomparison	Japan	26-30, October	High
5)	The IAEA/RCA Expert Advisory Group Meeting on Strengthening of Radiation Protection Infrastructures Project	China	November	High
6)	Expert Meeting on CRP on Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man	Japan	-	High

B. Proposal of Program Activities for 1993 -

	Title	Country	Proposed Dates & Period	Level
1)	Regional Training Course on the Safe Application and Control of Irradiation Facilities	China	May, 1993	Middle
2)	Regional Training Course on ICRP Publication 60	China	-	Middle
3)	RCM on Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man	-	1993	High
4)	Training Course on Radiological Emergency Preparedness	Japan	Twice in the next 5 years	High
5)	Training Course on Radiation Protection in relation to Industrial Application (Tentative)	Australia/ Japan	-	Middle High

Table 2
Some Suggested Subjects for Inclusion in the Project Phase II

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- 1) Intercomparison for Internal Dosimetry
 - 2) Development and Supply of Reference Asian Phantom
 - 3) Off-Site Emergency Preparedness
 - 4) Natural and Man Enhanced Radioactivity
— Tailing of Radioactive Ores, Coal Mines, Cement Industry, Gas Mantle
Factory, etc.
 - 5) Research Reactors
— Aging, Decommissioning, Dismantling, etc.
 - 6) Radiation Protection in Medical Application Practices
— Radiotherapy, X-ray Diagnosis, Nuclear Medicine, etc.
 - 7) Radiation Protection in Industrial Application Practices
 - 8) Feasibility of Application of a new ICRP Recommendation Publication 60 in
the Region.
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The meeting was jointly hosted by Japan Atomic Energy Research Institute (JAERI), Power Reactor and Nuclear Fuel Development Corporation (PNC) and National Institute of Radiological Sciences (NIRS).

The participation of the Australian expert was funded by the Government of Australia. Other experts were funded by the Government of Japan (Extra-budgetary contribution for RCA).

Review of IAEA/RCA
Personal Dosimeter Intercomparison Program in 1991

Personal dosimetry and the calibration technique is of importance in RCA member states for the purpose of quality assurance of radiation protection measurement. Since the practical personal dosimeter intercomparison and information exchange would be quite useful and desired for that purpose, the first step of the IAEA/RCA personal dosimeter intercomparison was performed in 1990 and revealed that there are some technical problems in RCA member states. In this point of view, further investigation and evaluation of personal dosimetry systems were hoped to be made. At the last Expert Advisory Group Meeting held in Tokyo, Dec. 6 and 7, 1990, the 1st program was reviewed and the plan of 2nd and 3rd phase personal dosimeter intercomparison programs were proposed and approved. According to the plan, the following 2nd phase programs have been conducted since May, 1991.

2nd phase of IAEA/RCA personal dosimeter intercomparison program

- 1) Field reference value (Calibration source) check
- 2) 2nd personal dosimeter intercomparison

The check of field reference value which is used for calibrating personal dosimeters has already been completed. Twelve organizations of eleven RCA member states participated in this program. By this field reference value check, it is found that the calibration fields of the participating organizations are controlled in reasonable level (the difference of the reference exposure value between JAERI and participant was less than 10 % even the worst).

The 2nd personal dosimeter intercomparison program is now being carried out (October, 1991 - January, 1992).

The results of the 2nd phase program of IAEA/RCA Personal Dosimeter Intercomparison will be reported at the workshop planned to be held in October, 1992.

IAEA RCA MEETING ON REFERENCE ASIAN MANBhabha Atomic Research Centre (BARC), 8-12 APRIL 1991SUMMARY

The meeting was convened at 10:00 on Monday, 8 April with an opening ceremony organized by the BARC staff. Seven of the eleven CRP participants' were in attendance. In addition, Dr. Mark Cristy, Vice Chairman of the ICRP Task Group on Reference Man and Dr. G. Tanaka of the Asian Reference Man Research Centre participated in the meeting. Their contribution was important because of direct ties to the 1) ICRP Reference Man work, and 2) the vast amount of data that has been accumulated by the Asian Reference Man Research Center.

The three major aspects of the CRP are compilation of data on 1) physical/anatomical parameters, 2) metabolism and 3) physiology. A great deal of work, particularly the anatomical aspects, was reported by Japan, India and China.

It was agreed that sufficient information is available to scale individual organ masses on body size parameters, particularly body mass. Therefore, emphasis in the physical/anatomical task area should be placed on accumulation of body size information for the remainder of the CRP. With regard to metabolism, general data across the board on national and regional diets is necessary. This includes the need for more information about elemental composition. Finally, physiological data to be reported includes daily energy balance, pulmonary function and daily water balance. Specific pulmonary function parameters were selected after consultation with the Chairman of the ICRP Lung Model Task Group.

On Monday afternoon, we began a series of status reports by the 7 participants. China, India and Japan have done a lot of work and had a great deal of information to present. Dr. Jixian Wang, Tianjin, reported having accumulated height and weight statistics on 920,000 people from 28 Chinese provinces. Organ weight information included heart, lungs, spleen, liver, kidney, brains, pancreas, adrenal, and thyroid information for about 23,000 people. In addition, he presented nutritional information taken from a 1982 study involving 50 urban and 116 rural locations in 27 Chinese provinces. Analysis included 25 types of food. Dr. Dang, a co-worker with Dr. Sunta, presented information on the daily, per capita intake of 11 types of nutrients, 17 elements and 17 radionuclides.

Dr. Sunta presented an overview of Reference India Man activities. Height and weight data have been collected on about 46,000 individuals from 20 to 60 years old. Brain, heart, kidney,

liver, lung, spleen and pancreas mass information has been accumulated for about 13,000 people. Stomach, thyroid, prostate, testes and adrenal data is available from about 400 people. Dietary data on 12 food classes has been obtained in 12 Indian states. Physiological information included pulmonary function (vital capacity, tidal volume, respiratory rate and minute volume) and water balance.

A great deal of information comes from the Asian Center for Reference Man Studies (Dr. G. Tanaka, retired) and the National Institute of Radiological Sciences (Dr. Kawamura). As part of the Asian Center for Reference Man activities, Dr. Tanaka provided the participants with a table of world statistics (attached) obtained from a number of recent, authoritative sources.

Dr. Rab Molla presented data relating to the anatomical characteristics of a Bangladeshi Reference Man. There was a report by Dr. Sugiarto from Indonesia on a study of anthropometric characteristics of about 200 people from Jakarta. In addition, he presented data on organ masses and dimensions, and dietary intake. Information on the Malaysian population was provided by Dr. Yadav. This included preliminary data on physical dimensions, growth patterns, pulmonary function and mean daily intake. In addition, he presented results of a study comparing the respiratory function of Malay Muslims during normal activity and during the Ramadan fast. Finally, Dr. Natera summarized Filipino Reference Man statistics, including physiological parameters, dietary intake figures, anatomical characteristics, and metabolic data.

Conclusions

1. Adequate organ mass data and scaling information, based on body size is available to specify reference man, major organ parameters. Therefore, anatomical emphasis should be given to obtaining complete physical characteristics (height, weight, chest circumference, chest width, chest depth and sitting height), primarily for those countries in the CRP where definitive information is not yet available.
2. More dietary information is needed in general. This includes compilation of daily per capita intake by 1) Food classification, 2) Elemental analysis, and 3) Age group.
3. We should coordinate with the Agency's programme on obtaining nutritional information, coordinated by Dr. Robert Parr, RILS.
4. Protocol
 - a. General

It was emphasized that the discrete ages for children

(1,5,10,15) should represent age ranges \pm 6 months, i.e. 6 to 18 months, 4.5 to 5.5 years, 9.5 to 10.5 and 14.5 to 15.5 years. However, it is recognized that for some data sources this is not possible. For example, data may be accumulated in one year intervals beginning with the date of birth (ie 4.0 to 4.9 years). In such cases, the specific age protocol should be clearly stated.

The adult population age range will be 20 to 50 in order to coincide with ICRP protocol. However, reporting in age sub-groups is encouraged.

b. Physical/Anatomical

The protocol outlined in the project formulation meeting in Mito City will be retained (attached). However, more emphasis is to be given to the information required by phantom makers:

Chest circumference
Chest width
Chest depth

These measurements should be an average of the values obtained after 1) inhalation and 2) exhalation.

Although, it was agreed that it is not required to present data for the adrenal, pituitary and thymus glands because of their small masses, availability of data on these organs for radiation protection purposes would be useful.

It was recommended that data on breast and ovary masses be added.

c. Nutrition

There was discussion about the recommendation from the Mito City meeting that nutritional information be obtained from "middle income groups". There was concern that, from the standpoint of protection of the public, this practice would not provide representative information. The conclusion was that the selection should represent the population distribution and that the method for determining the representativeness be left to the senior investigators. Other aspects of the Mito City protocol were reaffirmed.

d. Physiological Parameters

The two basic physiological parameters to be included are pulmonary function and water balance.

Where possible, the same population selection considerations used for 1) Physical/anatomical and 2) Nutritional parameters would be employed. It was pointed out, however, that there may be large quantities of data currently available through national, industrial and military medical sources. These data, if used, would have to be clearly identified as such and weighted accordingly in relation to their population representation.

5. Reporting

It is clear that a well defined data report format is needed and welcomed by the participants. I agreed to prepare draft reporting forms for their review and comment. Specific points that were discussed are:

- 1) Dr. Cristy emphasized the need to include body weight information that can be used to scale organ masses and similar data.
- 2) Errors should be reported in terms of standard deviations.
- 3) Minimum reporting should include median, mean and standard deviation. Differences between median and mean will help identify populations that are not normally distributed. Reporting of percentiles would be optional, but useful.

Recommendations

1. It was suggested that it would be useful to provide all participants with the same software for data processing. It should provide basic statistical information and be useable for fairly large quantities of data. I agreed to try to find something that would meet their needs.
2. The participants felt strongly that another meeting in 1992 is important. However, due to financial limitations this may not be practical.
3. A technical secretariat within the RCA membership is needed to address technical issues and coordinate the work. The Japanese had agreed to do this in Mito City, but only the Philippines took advantage of their offer to have some sample analyses performed. Drs. Koyanagi, Kawamura and Tanaka agreed to discuss this with their managements and identify a Japanese secretariat, probably NIRS.

India agreed to provide limited technical support.

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Survey and Control of Exposures in High Natural Radiation Areas

There are many areas in Asia and the Pacific where radiation levels are much higher than normal. The radiation exposures in such areas resulting from external radiation and from radon and radon daughters indoors are significantly high. There are also many natural springs, such as in Viet Nam, where radium concentrations are high and these can cause significant radiation exposures to the population. Such high natural radiation exposures can be associated with significant health risks.

The subject of natural radiation exposure has been receiving attention in recent years. Assessments made in some countries indicated incidence of lung cancer resulting from the exposures to radon and radon daughters in dwellings. Many countries in Europe and America have already taken up both regulatory and technical measures to reduce radon exposures in existing dwellings and to limit the radon concentrations in future buildings.

Some countries in Asia and the Pacific have already initiated programmes of surveys in high level natural radiation areas in order to assess the radiation exposures and the resulting health risks and some of such studies also include epidemiological investigations. It is felt strongly that co-ordination among the countries in the region would be extremely valuable in devising standardized systems of survey and assessments. In this respect a co-ordinated research programme is considered necessary. The CRP will include award of research contracts, organization of research co-ordination meetings as well as intercalibration programmes. For intercalibration of radon monitoring instruments Australia and China have the necessary facilities. Such intercalibration programme in the region may be supervised under the Intercalibration and intercomparison Programme of CRP on radon in the Human Environment.

The total cost of the CRP for a period of three years would be approximately US\$80,000.

Radon Exposures in Occupational Work other than in Uranium Mining

The subject of exposure to radon and/or external radiation during work in places other than in underground uranium mines have not received adequate attention so far. There are places, such as, underground hotels and facilities in China, subways and underground non-uranium mines where exposure to external radiation, radon and radon daughters may be significant from the view point of health risks. Since this is a new subject area a co-ordinated research project will be highly desirable in Asia and the Pacific region. Such studies will enable thorough survey to identify groups of population receiving exposure during their occupational work and to assess the radiation doses. All countries in the region are expected to be interested in such a CRP. The approximate cost would be US\$70,000.

Training in Radiation Protection in the Mining and Milling of Radioactive Ores

Some countries namely, Australia, China, India, Indonesia and Pakistan, have operational mining and milling activities while some other countries in the region are carrying out exploration for uranium. The uranium mining industries in Australia and China are quite extensive. In China and India many workers are involved. Regular training of the radiation protection personnel as well as workers on radiation protection is necessary. There has been no regional training course in Asia and Pacific Region organized by any national or international organization. There has been a strong desire by countries like China and Australia to organize training courses. Training courses under RCA would involve expenses for the travel and subsistence allowances of the lecturers and trainees. Also the host organization may need some financial assistance.

The first training course proposed for late 1991 or early 1992 may be hosted in Australia. The total expense would be approximately US\$50,000.

AUSTRALIAN COUNTRY STATEMENT

14TH RCA WORKING GROUP MEETING

TOKYO, 24-27 MARCH 1992

Australia is pleased with the progress achieved in the various RCA activities held in the last year. As the RCA enters into a new five-year term after twenty years of steady progress, there is evidence that the RCA now represents a mature association of Asian-Pacific countries in that significant benefits are being realized in the peaceful applications of nuclear science and technology in Member States. There have been numerous significant developments in RCA Member States since we last convened; in this context, Australia welcomes China's deposition earlier this month of its accession to the Nuclear Non-Proliferation Treaty.

The value of the RCA as a means of nuclear technical co-operation is underscored by the successful completion of the activities of the RCA/UNDP Industrial Project as the current phase of this project draws to a close this year. The final report on the Industrial Project, which was discussed at the Meeting of National Counterparts and Terminal Tripartite Review Meeting in Jakarta last November, is very positive and shows clearly the economic benefit that has been achieved in the region through the spread of nuclear applications in industry.

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 proposal for 1992 to 1995. Australia has been active in seeking continued UNDP support for RCA via representations in New York, in Manila at the aid co-ordinators' meeting and in Canberra during the visit of the UNDP regional administrator.

Some of the specific activities that we have contributed to include the following.

Industrial Applications:

(a) **Tracer Technology:** The success of this activity, which has the objective of forming and sustaining viable tracer technology groups in participating countries, was further enhanced by Australian experts providing demonstrations and conducting seminars in Thailand and Bangladesh, and the training of five fellows in tracer applications at ANSTO's Lucas Heights Research Laboratories near Sydney. In addition to these activities, there are in-country tracer demonstration missions planned for China, Indonesia and the Philippines during the remainder of 1992.

(b) **Radiation Technology:** ANSTO and the University of New South Wales held a regional training course on radiation curing of surface coating in Sydney from 18 February to 1 March 1991. The course was designed to take advantage of Australia expertise developed from the interaction of government, university and private industry research and development in ultraviolet radiation and electron beam technology. Australia has also supplied and installed a ultra-violet coating system at the Forest Products Research and Development Institute in Manila.

(c) **Nuclear Control Systems:** Under this sub-project, award-winning Australian-developed isotopic coal ash measurement technology is being transferred to the region through the establishment of a large scale demonstration and training facility in Thailand. More effective coal utilization resulting from the improved control has direct economic benefits and also reduces the adverse environmental effects resulting from coal contaminating the reject storage area. An ANSTO quality assurance engineer participated in an expert mission to address calibration problems and quality assurance issues at the demonstration plant.

Nuclear Medicine:

(d) **Training in the Use of Computers:** Two highly successful training courses on "The Use of Computers in Technetium-99m Imaging" have been held in 1989 and 1990 under the direction of the Royal Prince Alfred Hospital (RPAH). The success of these courses resulted in considerable demand for another, and Australia has provided the additional funding required for this to take place. This additional course was recently held from 9 to 27 March 1992 at RPAH and ANSTO Education and Training Centre. The purpose of this project is to provide participants with advanced training and practical experience in the application of computer techniques for analysis of gamma camera data. This will permit participants to use computers more effectively in nuclear medicine and also enable them to provide further training to other professionals in nuclear medicine at the local level.

(e) **Nuclear Instrument Maintenance:** Australia hosted the 2nd Regional Project Formulation Meeting on Nuclear Instrument Maintenance held in Sydney in February 1992. There has been a considerable increase in the number of gamma cameras and SPECT systems in use in the region in recent years and there is a need for the better integration and development of preventative maintenance and quality control programs for nuclear instrumentation. This formulation meeting produced a number of proposals and recommendations to enhance participating countries implementation of quality control and preventative maintenance

programs, and the upgrading and refurbishment of gamma cameras. The proposals include holding planning meetings, training courses, workshops, and expert consultations over the next five years.

Radiation Protection:

(f) **Training Course and Workshops:** Australia has funded two of the series of training courses on "The Development of Infrastructure for Ensuring Radiation Protection" in April 1988 and October 1990. ANSTO Education and Training Centre has extended these courses by organizing a novel workshop on "The Development of Techniques and Methods of Instruction in Radiation Protection", held in Sydney from 17 to 28 February 1992. This was attended by 14 experienced radiation protection specialists from 12 RCA countries. The workshop objectives were to instruct participants in the latest educational techniques and to adapt and use these techniques in the effective teaching of radiation protection as well as develop uniform training methods. The workshop was also successful in developing a valuable set of training materials and techniques for future regional training programs in radiation protection. Australia also provided an expert lecturer for the regional training course on the basic techniques of radiation protection held in Japan in October 1991.

(g) **Dosimetry:** ANSTO participates in the Project on Intercomparison of Personal Dosimeters which has entered a second phase with the recently completed cross calibration check of reference sources used in 12 organizations of 11 RCA member countries and currently a second intercomparison program for personal dosimeters is being carried out.

New Project Proposal

The future of each of the Australian sponsored activities is covered in Australia's new project proposal for the next phase of the RCA from 1992 to 1995. The details of this new project were circulated to member states late last year and it has met with considerable enthusiasm. The new 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 will be funded by Australia's extra-budgetary contribution to the RCA and is expected to be at the level of \$1,500,000 for the next 3 years.

Each of the proposed activities builds on the success and developments of the recent phase of RCA projects. The Industrial Applications component will hold two regional training courses in Australia which will complement seven expert missions each to two recipient countries and each specializing on an industry sector. The Industrial Radiation Protection segment will support the industry project by ensuring the safe use of nuclear techniques in industrial applications. The nuclear medicine component is designed to develop a correspondence course for nuclear medicine technicians so that more effective use can be made of existing nuclear medicine technology in the region and countries will acquire a level of self-sufficiency in the necessary skills.

Conclusions

The success of effective technology transfer, as is being achieved in the RCA/UNDP program of activities, is dependent on proper planning, development of human resources, and support for appropriate infrastructure development. Activities such as training courses, workshops, fellowship training abroad, provision of expert services and supply of equipment each contribute to individual Member States capacity and capability 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 is gradually being realized in Member States under the RCA/UNDP program.

Australia believes that the technical co-operation and national and regional knowledge and infrastructure developed as a result of our involvement in the RCA is greatly beneficial for the peace and prosperity of all. Australia looks forward to continued participation in RCA/UNDP activities. Much has been achieved to date and we are confident even more will be achieved in the future.

Country Statement of the People's Republic of China

14th Working Group Meeting of RCA Member States,

Tokyo, Japan, 24-27 March 1992

Mr. Chairman, Distinguished delegates, Ladies and Gentlemen,

It is our great pleasure to participate in this 14th Working Group Meeting of RCA Member States. On behalf of the Chinese delegation, I would like to express my congratulations on your election as chairman of this meeting and our gratitude to the Government of Japan for hosting this important meeting in an excellent manner, along with the warm hospitality, and wishes to join other delegates to congratulate the success of the meeting.

China has been associated with the Regional Co-operative Agreement (RCA) from 1985. Through her executing agency, formerly the Ministry of Nuclear Industry, now the China National Nuclear Corporation (Office of IAEA Affairs, Ministry of Energy), China has been involved in the UNDP/IAEA Regional Industrial Project and all the RCA Agricultural, Medical, Radiation Protection and Reactor Nuclear Power Projects and all the activities has promoted the nuclear technology application in industry, agriculture, medicine, get more economic and social benefits both in China and in other countries in some extent.

We would like to reiterate our faith in RCA for promoting regional co-operation in this area, and also reiterate that China will continue its technical support to RCA activities and its extra-budgetary support to RCA. In 1992, we will organize two Regional Workshops supported by our donation: Neutron Transmutation Doping and NCS Application in Steel Industry.

The progress made in the various activities in China during 1991 under the RCA programme is summarized as follows:

I. Tracer Application in Industry

Tracer technology has been used in hydrology, petroleum logging and many other industrial sectors in China.

IAEA has arranged an expert mission from Shanghai Institute of Nuclear Research (SINR) visited Sri Lanka, for leakage detection of underground oil pipe. A demonstration/NEMS on leak testing of pipe line will be held at Colombo, Sri Lanka, March 1992.

From 9-23 October, 1991, Dr. P. Airey, an expert from Australian ANSTO, as an IAEA expert mission, visit China. He visited nuclear research institute, and hydraulic research institute, and give us good advice on National Tracing Research Group's work.

Two Chinese participated the RTC on tracer industrial application in Jakarta, November. A fellow on tracer application in Australia has finished his duty.

The expert service of Dr. T.W. Tse for project CPR/8/004: Tracer study for monitoring potential zones in Dagang oil fields was finished.

II. Non-Destructive Testing

A network on NDT R&D has been developed in China. Many ministries have their NDT organizations. Many national activities on NDT have been organized every year. NDT application in nuclear power will be further strengthened.

In 1991, several participants from China attended the NDT training courses and workshop in Bandung, Tokyo, Kuala Lumpur and Bangkok.

III. Radiation Technology

1. Radiation Vulcanization of Natural Rubber Latex.

The National Research Group on RVNRL is under the Ministry of Chemical Industry. Zhuzhou Rubber Institute is the key institute of this group. Two participants from this institute participated Jakarta RTC in 1991.

2. Radiation Cross-linking

In Shanghai and Changchun we have organized many RTC, NTC and NEMS on radiation cross-linking application in wire and cable industry. They have promoted and demonstrated the technology, and transferred to the industry, got much economic benefit. Now, the annual output of radiation cross-linked products (wire, cable, shrinkable materials and others) has achieved 60 million Chinese RMB Yuan (more than 10 million US\$). In recent years, at Shanghai, Chengdu, Yantai, Tianshui and Beijing, new EB accelerators have been established (both domestic made and imported) and ^{60}Co facilities also have demonstrated its usefulness for some radiation cross-linking process (particularly for irregular shape special items).

A RTC on EB processing technology was held in Shanghai, 26 August to 6 September 1991. Shanghai University of Science and Technology (SUST) hosted this course. This course is the first one of this series course instead of the former RTC on Radiation Cross-linking in Wire and Cable Industry.

According to the arrangement of IAEA, one chinese expert visit Pakistan to give advices on establishment and operation of demonstration center for industrial application of radiation cross-linking of wire and cables.

3. Radiation Curing

In Shanghai, Chengdu, Hefei, Beijing, many universities and institutes are intensively conducting R&D on Radiation Curing, and promoting technology transfer to industry. Up to now, the Ultraviolet (UV) curing process have been used in more than 10 furniture and printing plants in China, and a Chinese company has produced UV curing machine for industrial use. A NTC on Radiation Curing will be held in Chengdu, China in 1992, we are expecting support from IAEA.

4. Radiation Sterilization

A NTC on Radiation Sterilization of Medical Supplies was held in Suzhou, 15-24 April 1991. Suzhou Medical College was the host. GMP (Good Manufacturing Practice) has been emphasized at this course.

A National Symposium on Industrial Radiation Sterilization was held in Beijing from 3-7 September 1991 hosted by Beijing Radiation Center and China Sterilization Society.

5. Radiation Industry

Now in China there are forty ^{60}Co Gamma facilities (Radiation Centers, design capacity larger than 100Kci each) and more than ten Electron Beam Accelerators in operation for industrial purpose, both used for radiation chemical processing, radiation sterilization and radiation preservation of foods.

The National Workshop on Safety and Radiation Protection of Operating Industrial Irradiation Facilities was held in Beijing from 2-6 September 1991, about one hundred participants from all radiation centres and EB accelerator units attended the workshop. Three IAEA experts gave lectures at the workshop. Workshop summarized the Safety situation of Radiation Facilities in China, strengthening of the safety was emphasized by the workshop.

The 8th International meeting on Radiation Processing (IMRP-8) will be held in Beijing from 13-18 September 1992. China Isotopes and Radiation Association (CIRA) and China Nuclear Society (CNS) will be the host. IAEA will be the co-sponsor. Before and after this meeting, China will host the following three IAEA meetings (RCM) and one training course (RTC) in Beijing, Shanghai, and Taiyuan, China. So some participants in Agency meetings will have a chance to attend the IMRP-8.

Workshop on Process Control of Food Irradiation, Shanghai, 31 August - 11 September hosted by Shanghai Irradiation Center (SIC).

Regional Training Course (RCA) on Radiation Sterilization of Tissue Grafts with Emphasis on Clinical and Sterility Quality Assurance Criteria, Taiyuan, Shanxi Province, 1-12 September hosted by China Institute for Radiation Protection (CIRP).

Research Co-ordination Meeting (RCM) on Radiation Processing Technology Application in Bioengineering, Beijing, 9-12 September, hosted by Beijing University.

Third Research Co-ordination Meeting (RCM) on Food Irradiation Process Control and Acceptance, Beijing, 21-25 September, hosted by the Institute of Application of Atomic Energy for Agriculture/Chinese Academy of Agricultural Sciences (IAEA/CAAS).

IV. Nuclear Control Systems (NCS) Application

1. NCS in Paper Industry

Now in China 70 sets imported NCS and 60 sets domestic made NCS have been installed in paper mills. The total estimated investments for NCS was about 30 Million US\$. In China, there are much more small and medium paper mills, so the application of low cost NCS specially for small and medium paper mills will be the orientation of R&D in China.

2. NCS-Steel Industry.

Shanghai Baoshan Iron and Steel Complex is a modern works, total 4.7 million US\$, NCS Systems have been in co-operation in this works. Besides, NCS Systems are also widely installed in Beijing, Wahan, Anshan and many other steel plants. A NEMS on NCS-Steel was held in Shanghai, 7-12 October 1991, about 60 participants attended the seminar. This year, another Regional Workshop on NCS-Steel will be held in Shanghai Baoshan Steel Complex from 8-12 June. This activity is an extra-budgetary contribution of China to RCA. Following topics will be discussed at this workshop.

Status of NCS Application in Steel Industry in the world, in China and in Baoshan and other steel works of this region. NCS-Steel maintenance and techno-economic benefit analysis, development and application of thickness gauge, Nuclear Weigh Scaler, level gauge and many others.

3. NCS - other industry

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

V. Food Irradiation

China has been actively participating in many IAEA and RCA activities on Food Irradiation. Up to now, the total quantities of irradiated foods in China was over 40,000 tonnes, including more than 20,000T irradiated garlic in Henan Province, 16,000T irradiated (sweet potato) spirit, seasonings and sausages in Sichuan Province, over 4,000T irradiated apples, potatoes, onions, garlies in Shanghai, Taiyuan, Nanjing and others. Recently, we arrange Shanghai, Chengdu and Nanjing to do marketing test of irradiated foods in some special stores, all have got positive results, owing to the good quality of irradiated foods, so the consumer's acceptance seems to be positive. Up to now, China has approved 8 kinds of irradiated foods, 7 more kinds of irradiated foods will be approved in the near future.

The National Workshop on Food Irradiation in China was held in Chengdu, Sichuan from 6-10 Nov. 1991. Sichuan Institute of Nuclear Technology Application was the host institution, more than 50 participants attended. IAEA expert, Dr. G. Giddings gave lectures at this workshop, and visited the market testing stores of irradiated foods in Shanghai and Chengdu.

China's National Co-ordination Committee on Food Irradiation (NCCFI) was set up in 1988, consisting of representatives from various ministries and national organizations. Its responsibility is to co-ordinate, organize and supervise all the activities of food irradiation in China, the Chengdu workshop was one of activities organized by NCCFI.

In 1992, two Regional Meetings related to Food Irradiation will be held in Shanghai, Beijing in September 1992.

VI. Nuclear Agriculture

Nuclear Techniques applied in China are popularized. More communications among different countries will be beneficial to the region. We can offer related techniques, experts and others.

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

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

Sterile insect technique (SIT), peach fruit borer, Chinese citrus flies and corn borer.

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

Radioimmunoassay for animal disease and health

Food irradiation preservation.

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

In 1991, some experts services to Beijing, Hangzhou and Yaan have given us many knowledge and experience on animal science.

In 13-17 July 1992, China will host an IAEA Research Co-ordination Meeting on Grain-Legume Nitrogen Fixation at Harbin, Heilongjiang, Soybean Research Institute.

Agriculture sector is very important to improve human life, all new project proposals are important.

VII. Medical and biological application

This is a very important sector in peaceful use of atomic energy to improve human health. We support the relevant projects and have been actively participating.

The Regional Training Course on diagnosis of hepatitis B by RIA was held at Shanghai Medical University from 18-29 March 1991, 18 participants from 11 countries attended. RIA and IRMA, laboratory safety, diagnosis, reagents, quality control, assay, epidemiology, and reagent availability within the Asian and Pacific Region, possible regional co-operation were discussed.

The National Workshops on Quality Control of Gamma Camera and SPECT was held at Beijing, Shanghai, Chengdu and Canton, from 21 Oct. - 10 Nov. 1991. Agency sent 2 experts to the workshops, more than 100 participants attended the four sites workshops.

National Training Course on Radionuclides in Food and Environmental Samples was held in Beijing from 22 Aug. - 21 Sept. 1991 under IAEA technical co-operation project.

RTC on Radiation Sterilization of Tissue Grafts with emphasis on clinical quality and sterility assurance criteria will be held from 1-12 Sept. 1992 in Taiyuan, China.

In addition, RTC on the Preparation and Quality Control of Radiopharmaceuticals will be hosted in Beijing, from 17 Aug. - 5 Sept. 1992.

VIII. Radiation Protection

Based on the conclusion made by the mid-term evaluation team, radiation protection and safety in isotope and radiation application should be emphasized, China paid more attention to activities in this field in 1991.

A National Workshop on Safety Operation of Industrial Radiation Processing Facilities was held in Beijing from 3- September 1991. Radiation protection and radiation safety status and problems of facilities and EB accelerators were discussed. 3 IAEA experts gave some lectures on the world status, radiation accident case studies and others.

The Regional Training Course (RTC) on Environmental Monitoring Related to Assessment of the Safety of Nuclear Facilities was held at Taiyuan, Shanxi Province, China from 14-25 October 1991. This is one of the Chinese extra-budgetary contribution activities to RCA.

China actively participated the following projects and activities:

- Development of infrastructures for ensuring radiation protection

- . Personnel Dosimeter Intercomparison
- . Compilation of anatomical, physiological and metabolic characteristics for a reference Asian Man.
- . Radiation protection in industrial applications (Radiation Processing, NDT, NCS Appl.) and in medical practice.

We welcome that the EAG Meeting of RCA Radiation Protection Project will be convened in Beijing, November 1992. Also we support the new project proposals in this area, in particular the proposal on "Training in Radiation Protection in the Mining and Milling of Radioactive Ores".

IX. Research Reactor, Basic Science and Energy Planning

Our first nuclear power plant - 300 MWe Qinshan Nuclear Power Plant was connected into electric grid on Dec. 15, 1991. Co-operation in nuclear power between China and other RCA countries such as Pakistan, Japan, Republic of Korea, etc. are progressing well. We support activities in nuclear power planning and implementation under RCA and hope to continue.

In respect of research reactor, the U-ZrH pulsed reactor has been successfully developed and was put into full operation in January 1991 with steady-state power 1MW, peak power 3420MW and peak beam flux 6×10^{16} n/cm². All the main parameters meet the design targets. At present, the reactor turns to applied research with emphasis on application in industry, agriculture and medical treatment. In addition, a new Miniature Neutron Source Reactor finished its construction in Shanghai, China. We will continue to participate the RCA activities in Research Reactor Utilization and extend our co-operation with our RCA Member States. From 5-12 October 1992, we will organize a Regional Workshop on Neutron Transmutation Doping (NTD) Technology, to be hosted by the China Institute of Atomic Energy (CIAE). This is an economic beneficial technology, we hoped to share knowledge and experience with others and to co-operate in this field.

Materials characterization using research reactor is a very interesting subject. We are prepared to host some activities in the future.

Lastly, Mr. Chairman,

We have noted the RCA resources at present and in future described in the draft annual report. We fully support the project proposal made by Australia and appreciate its generous contribution to RCA. Also, we noted many new additional project proposals. All of them are

important to the region. However, the budget is limited and so we suggest all the new proposals be prioritized and hope that the Agency will continue to seek for extra-budget.

In concluding, I would like to join other delegates to express our thanks to the host, the Ministry of Foreign Affairs of Japan, the Science and Technology Agency, and the Takasaki Radiation Chemistry Research Establishment, for their kind hospitality and the excellent arrangements made for this important meeting.

Thank you, Mr. Chairman.

14th Working Group Meeting of RCA Member States

Tokyo, Japan, March 24-27, 1992

Country Statement - India

R.G. Deshpande, Chief Executive,

Board of Radiation and Isotope Technology, Bombay 400094

1. INTRODUCTION

India is happy to participate in the 14th Working Group Meeting of the RCA Member States. We would like to thank the Government of Japan for kindly hosting the meeting and making excellent arrangement for the same. We recognize the useful contribution made by Japan to various RCA activities.

This meeting provides an opportunity to take stock of RCA activities in the context of present status of applications in nuclear science and technology in the RCA member states. We look forward to very fruitful discussions and hope that RCA will continue to foster regional co-operation in the area of application of nuclear techniques. India has actively participated in and supported a majority of activities conducted under the framework of RCA and has also shared its experience in the development of nuclear science and technology with other member states. The increasing number of projects brought under the purview of RCA during the past 5 years and the wide ranging subjects of the projects bears testimony to the viability of the programme and its acceptance by the member states.

India continues to vigorously pursue the goal of generation of electricity by the nuclear route and the applications in nuclear techniques in various fields. The second unit of the Narora Atomic Power project was commissioned early this year thus helping to increase the contribution of nuclear power to the overall power generated in the country. The nuclear power stations under construction at other locations are at various stages of construction and are expected to go to power progressively in the coming 4-5 years. Nuclear techniques are already playing important role in many areas of national development and we are committed to the use of these techniques in the future.

2. MEDICAL AND BIOLOGICAL APPLICATIONS IN NUCLEAR TECHNIQUES.

India has actively participated in the various projects in the area of medical and biological applications. Through the project on "Aerosol Imaging for Diagnosis of Respiratory Diseases in Developing Countries", India has made available a relatively simple technique which is useful for diagnosis of respiratory diseases in conjunction with a readily available reactor produced radioisotopes viz. Tc-99m. We are happy to note that other member states have also found this technique useful based on their experience with the equipment provided by India under the project. Under the project on "Use of Advanced Nuclear Medicine Equipments in Asia", the performance of gamma cameras used in 5 major nuclear medicine centres has been evaluated and corrective steps taken wherever necessary.

India places great emphasis on improvement in the quality of radiotherapy treatment and increasing its availability particularly in the semi urban areas. In the CRP on Introduction of Computerized Dosimetry and Data-Base in Radiotherapy of Cervix in Asian Countries the Tata Memorial Hospital has conducted clinical trial for Carcinoma of Cervix, which is the commonest cancer in Indian women. Out of a total of 150 cases planned for study, 106 patients studies have been conducted so far and these are being followed for late complications if any. India is participating in the new project on RIA for hepatitis diagnosis and is expecting to receive the equipment for RIA work shortly. India has successfully operated a tissue bank at one of the leading hospitals in Bombay which provides a range of tissue grafts for use in reconstructive surgery. India has played a key role in the project on Maintenance of Nuclear Medicine Equipment by organizing Regional Training Courses for scientists and engineers of the RCA countries. This is an important area and needs constant attention for upgrading of technician's skills. India would be happy to extend its assistance for organizing further training programmes and workshops on this subject. Under this research project, expert system software has been developed using IBM PC to implement functions such as failure - cause analysis, preparation of detailed inventory of equipments, spare parts and tools, management of preventive maintenance and check list & charts for fault detection.

3. FOOD AND AGRICULTURAL PROJECTS

In India about 20 agricultural institutions employ radioisotopes and radiation techniques for improvement in agricultural practices. The Bhabha Atomic Research Centre has undertaken a major programme for the development of important crop varieties through mutation breeding programme using ionizing radiations. Many mutant varieties of important crops such as groundnut and rice are being cultivated in the field. We will share our experience in this area by conducting a regional training course on the subject during 1992 at BARC, Bombay. India is

interested in adopting food irradiation technology and has participated in the Asian Regional Co-operation Project on Food Irradiation with emphasis on process control and acceptance (RPFI Phase III). In the Research Agreement on Hygeinization of Spices, we have investigated the reduction of bacterial load on irradiation and improved packaging materials and have participated in the programme on inter-country transportation trials. In the other Research Agreement, work is being carried out for optimizing the conditions for quarantine treatment of mangoes by gamma irradiation. The legislative aspects relating to food irradiation technology are being actively pursued and plans are under way for the practical demonstration of food irradiation process for certain selected food products such as spices and onions.

India supports the two new agricultural project proposals being put up for consideration at this meeting. India would like to participate in the project F-1 Sterility for Controlling Caterpillar Pests of Horticultural and Field Crops.

4. RADIATION PROTECTION

India has participated in the project on 'The Reference Asian Man' and has collected useful data for formulating characteristics of the Reference Indian Man and Reference Asian Man. The anthropometric parameters such as body weight, height, chest width and circumference, head height and circumference etc. were studied for population different age groups. The daily average intake of number of elements such as Na, K, Ca, Mg, Cu, Zn, Mn, Fe, Se, Co, Th etc. by adult Indian population is being determined by using neutron activation and atomic absorption spectrometry. The intake of these elements was found to be different for urban and rural population. The organ burdens for the above elements were, in general, lower than those of ICRP reference man.

During December 1991 India conducted a regional training course on 'Safety Aspects in the Industrial Applications of Radiation Sources' which was attended by 18 participants from RCA countries. The course was conducted from India's contribution to the RCA. The course included lectures by Indian experts, practical demonstration and field visits. India is interested in participating in the following new projects proposed under Radiation Protection for inclusion under RCA:

- i) Effect of exposure in high natural radiation areas
- ii) Radon exposure in occupational work other than uranium mining
- iii) Training in radiation protection in mining and milling of radioactive ores.

India has collected considerable data through the on-going programme on monitoring of population in high radiation background areas, which could benefit the project. India can also assist in organizing training courses on Radiation Protection in Mining and Milling of Radioactive Ores. India recognizes the need to create appropriate infrastructure for radiation protection in the RCA member states, so that the nuclear applications are accepted by the public on the basis of demonstrated radiological safety of these applications.

5. RESEARCH REACTOR, ENERGY BASED AND GENERAL PROJECTS

India has consistently supported the activities in the area of utilization of research reactors. We believe that promoting programmes in this broad field can greatly help in preparing trained manpower which can take up challenging jobs in many areas of nuclear technology. India therefore, strongly urges greater funding for the project on research reactor utilization.

India welcomes the new project proposal 'Nuclear Techniques in development of Advanced Ceramic Technologies' and would be happy to participate in the project. At BARC, ceramic materials like titanates, cuprites are already being studied and over 30 research publications have already materialized so far in this area. Neutron diffraction and neutron scattering techniques can play valuable role in development of advanced ceramic technologies. India had indicated at the 20th General Conference Meeting of the RCA member states its willingness to hold a School on Applied Aspects of Neutron Scattering for the scientists of this region. The subjects would include engineering applications like residual strain measurements, chemical applications like real time diffraction for study of chemical reactions in commercially interesting materials like cement and small angle scattering problems having bearing on metallurgical applications and the applications in the areas of chemical industries, like study of colloids, micro emulsions, micelles etc. The school could be organized in 1993 with funding from India's extra-budgetary contribution to the RCA.

We have reviewed the new project proposal on Accelerator Based Technologies. While we agree, in principle, to the usefulness of such a project, we find that the project proposal in its present form covers a very wide range and it would be unrealistic to expect to achieve all of the objectives listed under the project. It is suggested that a revised project proposal be prepared at the project formulation meeting with a more specific programme which could be realized on the basis of the accelerators and the expertise available and the current interest. The list showing scientists in India who are engaged in related research activities as provided in the Project Proposal also needs to be updated.

India hosted a regional workshop on Image Processing in Materials Science and Non-destructive Testing at BARC during January 13-24, 1992. The workshop was attended by 10 participants from RCA member states and 7 national participants. The workshop included lectures, demonstrations, tutorials covering the basics of image processing, image enhancement techniques and various application areas. The workshop was well received by the participants who found the practical sessions most rewarding. Field visits were also arranged to a few specialists laboratories and institutions.

6. OTHER PROJECTS

India has proposed that RCA should support a project on activities relating to nuclear information. Some of the activities which can be considered initially for this purpose include evaluation of status of existing nuclear information systems and identifying specific needs in various countries, identifying areas in which RCA member states can offer training in nuclear technology and finally installation of equipment required for effective utilization of the latest developments in information storage and retrieval system.

7. INDUSTRIAL APPLICATIONS OF RADIOISOTOPES AND RADIATION TECHNOLOGY

India continues to actively promote the use of isotopes and radiation techniques in industry. In the area of industrial sterilization of medical products, the last year saw considerable growth in the utilization of radiation technology. All the 3 plants in operation in the country have upgraded the cobalt-60 source for increasing their throughput. Industry is increasingly utilizing tracer techniques for trouble shooting, and as also for evaluation of industrial process parameters and in effluent discharge studies for environmental pollution control. India has always tried to maximize its contribution to the activities of the 4 sub-projects in the recently concluded UNDP Industrial Project. India will continue to act as a resource country for the new project which has been submitted for UNDP funding. India could provide training facilities, experts and some equipment for implementing the project. India would like to reiterate the use of TCDC concept in the execution of the new UNDP industrial project.

8. CONCLUSION

In conclusion, I would like to reassure that India will continue to support the activities under RCA Programme and would willingly share its experience and expertise with other member states. In the past India has repeatedly made the plea that the RCA programme should now include research programmes on subjects relating to nuclear power generation e.g. in the areas of prospecting and mining of uranium operation of research reactors, radioactive waste

management, development of infrastructure for radiation protection, environmental monitoring etc. which are vital for supporting nuclear power programme. We once again request that RCA take some concrete steps in instituting viable projects in these areas.

COUNTRY STATEMENT OF INDONESIA DELEGATION
AT THE 14TH WORKING GROUP MEETING OF RCA MEMBER STATES
TOKYO, JAPAN 24-27 MARCH 1992

Mr. Chairman,

My Delegation would like first of all to join the previous speakers in congratulating you upon your election as Chairman of this important meeting. I am confident that under your wise guidance the meeting will give important and fruitful results.

It is my great pleasure to participate in the 14th RCA Working Group Meeting here in Tokyo the metropolitan of Japan. My delegation would like to extend its gratitude to the Government of Japan for hosting this important meeting and for the excellent arrangement prepared by the Organizing Committee.

Indonesia has maintained its active contribution in almost all RCA programmes since its inception as member of RCA in 1972. We do believe that RCA is the most effective vehicle in the regional co-operation, mainly in the transfer of nuclear science and technology to all member countries in the region. We are confident that much benefits have been gained from this regional co-operation.

My delegation wishes to take this opportunity to present its brief report on some remaining activities in regard with the UNDP/IAEA/RCA Regional Project on Industrial Application of Isotopes and Radiation under RAS/86/073 carried out up to the end of 1991 in Indonesia as follows:

Sub-project: Tracer technology

Tracer technology activities carried out in Indonesia are namely:

A UNDP/IAEA/RCA Regional Training Course on Tracer Application in Industry was carried out at the Center for the Application of Isotopes and Radiation of BATAN, Jakarta, from 11-29 November 1991. This RTC was attended by representatives from Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Sri Lanka, Thailand and Viet Nam. The training programme comprised of lectures, discussions, six laboratory experiments and three field demonstrations namely in paper industry, cement industry and geothermal field.

Still under the programme of UNDP/IAEA/RCA Industrial Project Indonesia has been invited to send her technical assistance expert to join a demonstration on leak testing in the buried pipeline utilizing isotope tracer which is carried out in Sri Lanka from 8-20 March 1992.

An Executive Management Seminar under the UNDP/IAEA/RCA Industrial Project which includes a field demonstration will be held at CAIR BATAN in July or August 1992.

Some other activities on tracer application related to IAEA's Programmes, which have also been carried out are namely:

A training facility to one fellow from Viet Nam at CAIR BATAN in studies on tracer application in sedimentology, in the laboratory as well as in the field activities on sediment movement studies of Cirebon harbour. This was a good example of a TCDC manifestation. In this particular field Indonesia has enough experience dealing with problems of harbour sedimentation, with special emphasis to find out a proper dumping site for disposing dredged materials in connection with the assessment of dredging efficiency.

In this connection a Regional Workshop on the Utilization of Isotope Techniques in Sedimentological Problems was carried out at CAIR BATAN in July 1991. This Regional Workshop has been conducted in connection with the Technical Co-operation Programme of IAEA and were participated by representatives from several countries in the region, namely Bangladesh, China, Indonesia, Malaysia, Pakistan, Singapore and Viet Nam and one Technical Officer from IAEA. The participants have the opportunity to witness the injection of a tracer isotope in the context of sediment movement study of Cirebon harbour.

Some other projects on the application of tracer techniques in the context of the national programmes which have been carried out are as follows:

1. Two projects on Enhanced Oil Recovery have been done in October 1991 and January 1992 in two different places in South Sumatera. The use of tracer test in this regard is to assess the effectiveness of water that has been injected into the well to enforce the flow out of the underground reserved oil of the production well. The tracer used for this study were tritium and cobalt-60 in the form of cobalt potassium-cyanide.
2. A project on leakage study on the crater's lake of Mount Galunggung West Java, has been carried out in August to December 1991, by utilizing radioisotopes Cr-51 as Cr-EDTA and Tritium and by analyzing the stable isotope composition of precipitations, lake water

and down stream outflows. It turned out, that one of the outflows was identified, originated from the lake.

3. A study on the inter-connection between steam wells in the geothermal field of Kamojang West Java will be carried out next April 1992 by using tracer application.

Sub-project: Non-Destructive Testing

An Expert Advisory Group Meeting on Radiation Protection for NDT Radiographers was held in Jakarta, on January 31 and February 1, 1991. Eight experts were participated at the meeting.

A Regional Board Meeting on Ad-hoc Regional Board of Examination Review was held in Jakarta from 28-30 January 1991 and four experts were participated at the meeting.

One of the main activities of the Sub-Project of NDT in 1990/1991 is training course both on national and regional level dealing with NDT conventional methods, such as PT, MT, ET, UT and RT.

The national training courses were carried out at different places and organized by BATAN, BATAN, and LUK-BPPT. Some of the national training courses were supported by IAEA experts.

A National Training Course on UT Level III was held at BAT Bandung from 9-27 July 1991. There were twenty four participants taking part in the course including six from Indonesia.

Another Regional Training Course on Magnetic Particle and Liquid Penetrant (Surface Methods) Level III, has been carried out at IPTN, Bandung from 9-27 September 1991. There were eighteen participants taking part in this course, including six from Indonesia.

More personnels with the three level qualification on NDT technical methods is still needed to enable the National Qualification and Certification Body to be functioning as required.

Sub-project: Radiation technology

As described in the tentative work plan for 1991, CAIR-BATAN has been appointed to be host of several project activities.

An Expert Advisory Group (EAG) Meeting has been conducted at CAIR-BATAN, and was attended by Dr. T. Pendle (UK), Dr. Keizo Makuuchi (Japan), Dr. N. Nakamura (Japan), Dr. R. Thomas (India), Dr. N. Nadaradja (Sri Lanka), Mr. Toha Rodasi (Indonesia) and Mr. F. Sundardi (Indonesia). The EAG meeting has recommended the selection of an appropriate process of natural rubber to be used as raw material of RVNRL. Some antioxidants were rejected to be used during the NR latex processing. In addition, an appropriate irradiator design is urgently needed to anticipate industrial scale production of RVNRL.

A Regional Training Course on Radiation Vulcanization of Natural Rubber Latex has been conducted at CAIR-BATAN from 26 June to 10 July 1991. Eighteen participants from various RCA member countries attended the RTC and five participants were selected as the best at the closing of the training course.

In order to improve science and technology capability of BATAN's staff and the collaborative institutions and companies, a National Training Course on Radiation Chemistry and its Application in Industry has also been conducted from 4-15 February 1991. Twenty-six participants have attended the course and IAEA has provided three lecturers to the course, namely Dr. V. Markovic (IAEA), Professor Dr. Y. Tabata (Japan) and Professor Dr. C. Von Sonntag (Germany). At the end of the course ten participants was selected as the best.

A National Training Course on Industrial Radiation Sterilization - Quality Assurance has been conducted at CAIR-BATAN from 18-22 February 1991. Twenty participants have attended the course and IAEA has provided two lecturers to this course, namely Dr. V. Markovic (IAEA) and Dr. M. Saunders (Australia). The course was attended by participants from pharmaceutical companies and it has been concluded successfully.

At present, CAIR-BATAN provides radiation sterilization services for more than forty pharmaceutical companies surrounding Jakarta. Several kinds of medical and pharmaceutical products have been sterilized at CAIR-BATAN's irradiation facilities, i.e., cotton wool, sanitary napkins, bandage, plastic films, catheters, surgical rubber, some kinds of containers for pharmaceutical products, medicated tapes and plastic droppers.

In addition to the above mentioned products, radiation services are also applied for sterilization of medicated dressing, medicinal herbs and peat soils.

A private owned commercial plant for radiation sterilization of medical products is expected to be operational soon at Cibitung, 30 km from Jakarta, under a good management of PT. Perkasa Sterilindo. BATAN gives its fully supports and advises to this company.

Research and development on radiation cross-linking of wire and cables is under preparation. CAIR-BATAN has had the opportunity to send three scientists to participate at a short training course on radiation cross-linking held in Shanghai, China, since 1989. One person from a private company, PT. Kabelindo Murni, has also been participated at the training course in 1989.

In order to initiate R&D in this subject, CAIR-BATAN plans to purchase a high energy (2 MeV) electron beam machine which is expected to be commissioning about two years from now.

Sub-project: Nucleonic control system

None has been carried out in Indonesia in regard with NCS programmes of RCA. As been reported previously, that more than hundred private industries in the country have already furnished with NCS in their factories. The main problems faced by most industries are lack of experience and skilled personnels in the operational and maintenance of the instruments. In this regard, BATAN is not only dealing with the issuing of licenses to the industries but also assists them in the operational and maintenance.

Project Co-ordination

There are two activities conducted in Jakarta in the context of Project Co-ordination, namely a National Counterparts' Meeting which was held on 25-27 November 1991 and was participated by all national counterparts, and a Tripartite Review Meeting was also held on 28 November 1991 in Jakarta and participated by all National Counterparts and the UNDP Resrep.

Indonesia has actively taken part in both events.

Mr. Chairman,

Since UNDP/IAEA/RCA Regional Project on Industrial Application of Isotopes and Radiation Technology Phase II has been terminated in 1991, my Delegation wishes to express its satisfaction on the achievements and highlights gained from the implementation of the project as the whole as well as locally in Indonesia. My country has participated fully and actively in almost all programmes since the beginning of the project. We realized that from time to time our national ability and capability on the industrial application of isotopes and radiation technology have significantly increased.

From the viewpoint of Indonesia, the project has been a most successful vehicle for the transfer of nuclear technology to regional industries.

On this occasion my Delegation is also pleased to address its sincere appreciation to the IAEA, RCA Co-ordinators and its Technical Project Officers, and to all RCA Member Countries for the efforts done to bring up the project to its successful results.

Others.

Reports and comments in relation with other activities in the context of RCA Programme (Medical and Biological Applications of Nuclear Techniques, Agricultural Projects, Research Reactor, Energy Based and General Projects and Radiation Protection Projects) will be presented under the respective individual agenda items.

Thank you.

Japanese Country Statement
at
The 14th RCA Working Group Meeting
Tokyo, Japan, 24-27 March 1992

Mr. Chairman, Distinguished Delegates, Ladies and Gentlemen,

On behalf of the Japanese delegation I would like to express that we are privileged to host this 14th RCA Working Group Meeting in the year to celebrate the 20th anniversary of the establishment of the RCA, and are honoured to have the opportunity to welcome both the distinguished delegates of the member states and observers from Mongolia to Tokyo, and we wish you all a pleasant stay in Japan.

Japan has actively associated itself with the RCA activities since its participation in 1978 and has made financial and technical contributions required for the RCA projects. Japan strongly believes that the RCA provides excellent opportunities for the promotion of peaceful uses of nuclear energy to contribute to the economic development and prosperity in the region, bringing about at the same time scientific and technological benefits for each member state.

Japan has been promoting the co-operative activities within the framework of the RCA with particular emphasis on the transfer of technical skills and on the development of human resources. This year Japan will continue to support three large RCA projects, namely the bridging activities for 1992 in the field of Industry, the Medical and Biological Project, and the Radiation Protection Project.

Mr. Chairman, Distinguished Delegates, Ladies and Gentlemen,

Japan congratulates the RCA on its successful completion of the 2nd Phase of the UNDP/RCA Industrial Application Project, to which Japan extended a financial support of about US\$1.43 million. The 2nd Phase obviously realized considerable results with efforts of each member country during these 10 years especially in the field of research and development, transfer of technology, and promotion of human resources. It is hoped that the outcome of the Industrial Project will be consolidated and introduced more to practical uses in the future.

If I may outline briefly the activities of this project in 1991 which Japan participated in, with regard to Radiation Processing, Japan hosted 3 activities and sent 2 experts to a regional training course in Indonesia. As to Non-Destructive Testing, Japan hosted 1 regional training course and sent 7 experts to courses in Indonesia, Viet Nam, Malaysia and Thailand. With respect to Nucleonic Control System, Japan hosted 1 regional workshop and sent 1 expert to a national seminar in China.

Japan supports the realization of a new UNDP/RCA project titled "the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development." Let us call it an "Environment Project" to be short. In order to secure the realization in 1993 of the Environment Project, in October last year Japan asked the UNDP Headquarters in New York, together with Australia, to support the Project financially. Again in January this year at the UNDP Meeting of Aid Co-ordinators in Asia and the Pacific (MAC-5) held in Manila, a Japanese representative made a statement to ask the UNDP to give due and favourable consideration for the Environment Project. On our part Japan will technically and financially provide as much support to the Project as possible like it did for the UNDP/RCA Industrial Project.

Japan supports a bridging activities in 1992 in the field of Industrial applications, and will extend technically and financially as much contribution as possible by sending Japanese experts and hosting activities. Due to the constrained budgetary situation with the UNDP contribution being nil for this year, Japan hopes to be in closer touch with the RCA Secretariat for the implementation and further details of the activities so as to produce good results out of these activities.

Japan welcomes the new project proposal from Australia in the field of industry, industrial radiation protection, and nuclear medicine, and wishes to make some comments. With regard to industrial applications, Japan hopes to see it well co-ordinated with a UNDP/RCA Environment Project. As to industrial radiation protection, Japan welcomes the Australian initiative of preparing training manuals, which would certainly become one of the assets to be shared with the RCA activities. And on holding training workshops in this field, Japan wishes to see them well co-ordinated with a 2nd phase of Radiation Protection Project to be started in 1993. A project formulation meeting for a 2nd phase to be conducted in Tokai this June could offer an excellent opportunity for this co-ordination with Australia. With respect to nuclear medicine, Japan could contribute not only by sending Japanese experts to an advisory committee on nuclear medical education for medical technologists, but also to the programme itself in such fields as handling of equipments and improvement of fundamental knowledge, and hopes therefore to have consultations with Australia.

Japan made active contribution in 1991 in the field of Medical and Biological Applications Project. With regard to Nuclear Medicine, both the ultra sound images of phantoms acquired from participating countries and analysis made by participating countries on 103 samples of liver diseases were respectively reviewed in 1991. Japan will continue to support this CRP on "Imaging Procedures for the Diagnosis of Liver Diseases" so as to successfully conclude its 2nd phase (1988-92) this year with conducting its critical review and holding a

consultant meeting for a 3rd phase before March next year. It is intended to publish the outcome of the 2nd Phase as an atlas by 1993. As to Radiation Therapy, in 1991 Japan sent experts to Sri Lanka. And, while using an existing software for computer-related therapy so as to familiarize the participating experts with radiation treatment planning techniques, Japan promoted a development of an original software. Japan will continue this effort in 1992, and will conduct its critical review and holding a consultant meeting for a 3rd phase of "Improvement of Cancer Therapy" by 1993.

Due to the domestic reasons towards food irradiation, Japan ceased its financial support at the completion of Phase I Food Irradiation Project. However, Japan has remained interested in co-operating and contributing in kind to R&D in this field. In 1991 Japan sent 1 expert to a regional workshop in Thailand and 1 expert to a research co-ordination meeting in Indonesia.

As to Research Reactor Utilization Project, Japan will continue to extend possible support through, for instance, sending experts and receiving researchers and trainees.

Japan actively supported the Radiation Protection Projects (1988-1992) in 1991 by sending 1 expert to India and hosting a regional training course and a expert advisory group meeting. Japan will continue to support this project by hosting a 2nd regional expert workshop in Tokai in October on Comparison of Personal Dosimetry. The Radiation Protection Project will complete its term of 5 years by the end of this year. With this in mind, both the intensified activities in the field of peaceful uses of nuclear energy among the RCA Member States and the increasing importance of nuclear safety, Japan is pleased to announce that it wishes to support a 2nd phase of this project. For this purpose Japan will host a project formulation meeting in Tokai in June.

As the Draft RCA Annual Report 1991 puts it, it was unanimously agreed at the 20th RCA General Conference that renewal of the current RCA Agreement should be done in the form of "an extension agreement as had been done previously". Background Documents prepared by the RCA Secretariat contain a draft for the renewal of the Agreement. Japan ought to point out that the draft in there prepared by the RCA Secretariat should have been circulated much earlier than it was actually done, and that the form and contents there do not coincide with what the 20th RCA General Conference unanimously agreed. So as to review the current 1987 RCA Agreement without any alteration of the articles, as agreed in Vienna last September, Japan tables its draft before this Meeting for discussion and acceptance by the member states. This draft does correspond to the unanimous consent at the last RCA General Conference to follow the method previously adopted in 1977 and 1982 when our predecessors extended the 1972 RCA Agreement without any alteration of the articles.

In case more explanation is needed, the fact needs to be pointed out again that this time in 1992 we are in consent that the RCA framework and activities should be extended without any alteration of the articles of the 1987 RCA Agreement. And therefore it is logical and most appropriate not to follow this time the method adopted in 1987 but to follow that in 1977 and 1982. In 1987 the RCA member states extended the RCA framework and activities with alteration of the articles of the 1972 RCA Agreement, which is the reason the RCA member states did not follow the method of 1977 and 1982. Japan should be most grateful if this matter of renewal of the RCA Agreement is directed towards the right and consistent direction which well links the past and the future of the RCA.

Japan accepts the principle and outline of the 1992 action plan, and will extend active support as much as possible technically and financially to activities of this year. Japan hopes to be in closer touch with the member states and the RCA Secretariat in implementing those activities so as to maximize the outcome and lay a better foundation for the future.

Although it is not in a position to confirm the 1992 cost projections in the Background Documents, Japan will continue to extend as much financial support as possible to the RCA activities in which it participates, with a view to consolidating and enhancing the momentum of the activities.

Statement of the Republic of Korea
The 14th Working Group Meeting of RCA Member States

Tokyo, Japan, March 24 - 27 1992

Mr. Chairman,

It has been always my great pleasure to participate in the 14th Working Group Meeting of RCA Member States, which is now being held in Tokyo, and to have an opportunity to deliver a statement of the Republic of Korea before the delegates of the Member States. On behalf of the Korean delegation, I wish to express my congratulation on your election as the chairman of this working group meeting. My delegation is fully convinced that under your leadership this meeting will bring constructive results.

My delegation also wants to express our gratitude and appreciation to the Government of Japan for hosting this meeting and the unsparing hospitality.

We consider that the value of the RCA as a means of technical co-operation the Asia and the Pacific region continues to be illustrated by the range of projects of benefit to the region being undertaken within its framework.

The following are some major outlines of the RCA projects implemented during the last year in Korea.

Review of RCA Technical Projects

1. Regional Industrial Project

1.1 Tracer Technology

- . In 1991, a KAERI staff member has been attached to the UNDP Regional Office, Jakarta, as a tracer expert. Korea is willing to provide its expert in this field when needed by other countries in the Region.
- . A tracer expert has also been assigned to NEMS/DEMO in Sri Lanka in March, 1992
- . A tracer expert visited KAERI in November 1991 for advises on the RTD data analysis technique.

Korean national tracer mostly consisting of KAERI expert will continue R & D works to expand tracer needs in the local industries through disseminations of information. The Korea Small and Medium Industry Foundation is the contact point.

1.2 Non-destructive Testing (NDT)

The NDT project co-ordinator participated in RWS as lecturer 3 times. In addition, 4 participants were at regional workshop on Non-destructive Examination of Non-metallic, Bangkok and Weld Defect Sizing using NDT, Tokyo in 1991, respectively.

National Seminar on NDT was held at KAERI on 24-25 January, 1991 with 104 participants.

Regional training course on the "NDT and Evaluation of NPPs" will be held in October 1992 at KAERI, in an effort to share our experience and technology with RCA Member countries.

1.3 Radiation Technology

Standardization of the methodology and radiation dose for the radiation sterilization is needed. To meet the standardization, adoption of ISO standard is recommended. Scope of the radiation technology should be broadened to such field as environmental preservation and tissue graft sterilization.

1.3.1 Radiation Sterilization of Medical Products

After successful demonstration project, the technology has already been transferred for commercial applications, namely to the Greenplatech Co. who has 450 kCi Co-60 irradiator.

1.3.2 Cross-linking of Wire/Cable

The Gold Star Cable Co. has been operating 3 EB machines for manufacturing radiation cross-linked wire/cable. In addition, 7 local private companies have installed EB machines individually and now under test operation.

1.3.3 Radiation Vulcanization of Natural Rubber Latex

One manufacturer producing rubber gloves and condoms has a strong intention to introduce the techniques in the nearest future.

1.3.4 Surface Coating of Plywood

Plywood industries are not much interested in radiation coating owing to difficult situation of our wood industry, however they are much interested in UV coating because of the low cost of UV coating machine.

1.4 Nucleonic Control System (NCS)

Even though there is no indigenous NCS manufacturer in Korea yet, technical advancement has been made through participation in various training courses held under the UNDP/RCA projects.

The national co-ordination network is now well established.

As the local industry feel difficulties in replacing the old radiation sources in NCS with new ones, the KAERI RI group will support the source replacing service in the next phase.

2. **Medical and Biological Project**

2.1 Radioimmunoassay of Thyroid Related Hormones.

External QC conducted; data base programming, evaluation and notification of QC results to 38 laboratories.

We hope to increase the number of QC participating laboratories from 38 to 50. The result of QC should be published and officially evaluated possibly by the experts from the Korean Society of Nuclear Medicine.

2.2 Radioimmunoassay for Hepatitis B Diagnosis

Seoul National University Hospital submitted application form to the Agency for a contract research project.

2.3 Radiation Sterilization of Tissue Grafts

- . Regional Seminar was held in Korea in December 1990
- . The project co-ordinator will attend to the Regional Seminar to be held in the Philippines in 1992.

2.4 Evaluation of Imaging Procedure for the Diagnosis of Liver Disease.

- . After taking liver images both by ultrasound (3381 cases) and by radio-colloid scan (2167 cases), overall 1,600 cases were directly reviewed.
- . Copies of the films were sent to Japan.

2.5 Computer Assisted Planning and Dosimetry in Radiotherapy of Carcinoma of Cervix (Improvement of Cancer Therapy, Phase-II)

- . CRP Renewal form has been submitted to the Agency to increase the number of applications to patients and to analyze the results by means of computer programme.

2.6 Aerosol Inhalation Imaging for the Diagnosis of Respiratory Disease

- . A KAERI and TC-99m phytate and a BARC made aerosol were used.
- . Lung images were obtained by various means; the radioaerosol images were significantly analyzed comparing with other means.
- . The current research has been carried out with no major difficulty envisaging a successful outcome.

2.7 Nuclear Instrument Maintenance

- . 113 gamma cameras are in use in 74 hospitals in Korea. Emphasis is placed on the maintenance and image quality control of the gamma cameras.

3. Agricultural Project

3.1 Food Irradiation Process Control and Acceptance

- . 450 kCi Co-60 irradiator is now in commercial operation by the Greenplatech Co. since 1987.
- . A total of 17 food items have been approved by the government authority for gamma irradiation.
- . The Greenplatech also sterilizes medical products and the operability of the irradiator recently reached to about 20 per cent. Among the total irradiated items, approximately 70 per cent is medical products and some 30 per cent are foods.
- . Most of the food industries in Korea fully recognize the benefits and advantages of the irradiation techniques, however there are still a wide concern about the use of this process among the general public.
- . As the Korean Government prohibited the use of EO gas for the sterilization of spices etc., the prospect of food irradiation techniques is expected to be promising.
- . The Greenplatech Co. in co-operation with research organizations and authorities hold a positive attitude for promotion of consumer acceptance about the irradiated food. The number of manufacturers utilizing irradiation processing has been increased to 190 in 1990.

4. Research Reactor Utilization and Energy Based Project

4.1 Research Reactor Utilization

- . One trainee and one lecturer were attended to the training course held in Indonesia in November 1991.
- . Korea will continue to participate in the CRP on computer application for better of operation and maintenance of research reactors

4.2 Nuclear Power Planning and Manpower Development (Training Course)

RTC was held at KAERI in October 1991 with 15 participants from 9 member states under full financial support of Korean government. It was the 4th RTC sponsored by the Government.

In 1992, the title of RTC will be modified to "Non-destructive Testing and Evaluation of Nuclear Power Plants", and will be held at KAERI in October 1992. The aim of the RTC is to share our experience and to facilitate the technology transfer to other countries in the Region.

5. **Radiation Protection**

5.1 Strengthening of Radiation Protection Infrastructure

Engineers had been trained through participation in the training course.

The Republic of Korea is pleased to note that it has greatly benefitted by various RCA projects during the past, in particular, radiation technology with maximizing the utilization of Co-60 and electron beam accelerator contributed from UNDP.

Korean delegation would like to take this opportunity to thank Professor Noramly bin Muslim, DDG of the Agency responsible for TA. We recognize that his leadership and devotion to the Agency's programmes have been remarkable and unforgettable.

Thank you.

MALAYSIAN COUNTRY STATEMENT

14th RCA Working Group Meeting

24-27 March 1992, Tokyo, Japan

The Malaysian delegation wishes to express its sincere gratitude to the Government of Japan for hosting this important meeting with such excellent arrangement.

The Malaysian delegation is encouraged to note the continuing progress made through the RCA programme during the past years. We strongly believe that the RCA programme will continue to be one of the useful and important vehicles for nuclear technical co-operation in the Asia and Pacific region. The success of the programme is well illustrated by the achievements and the benefits gained by the region. The four major activities in the RCA programme i.e. Medical and Biological Applications of Nuclear Technique, Food and Agriculture, Research Reactor and Energy Based Project and the UNDP Regional Industrial Project have fulfilled the current needs of the region in the development and promotion of nuclear science and technology.

Malaysia has maintained active participation in the various RCA projects over the past years and a summary of activities implemented by Malaysia in relation to these projects is as follows:

UNDP REGIONAL INDUSTRIAL PROJECT

Malaysia has participated actively in the UNDP Regional Industrial Project since its inception in 1982. We consider this project as an effective vehicle for technology transfer to the relevant industries. The successful completion of phases I and II of this project has made great contribution to expediting industrial application of nuclear technology in the region. A number of activities carried out in the four sub-projects in 1991/1992 are as follows:

NON-DESTRUCTIVE TESTING

Malaysia hosted a Regional Model Qualifying Examination RT-3 on 21-25 October 1991. The examination was attended by 17 participants and 2 observers from the region. In 1992, Malaysia will be organizing two activities, namely:

- i. Expert Group Meeting on Proficiency Testing Programme for NDT tentatively scheduled for May 1992.
- ii. National Seminar on NDT for Non-metallic Materials in December 1992. The Seminar on NDT will be jointly organized by Nuclear Energy Unit and University Technology Malaysia.

TRACER TECHNOLOGY

The Tracer Technology group at the Nuclear Energy Unit has provided services to several related government and private agencies in the application of tracer technology for sediment transport studies, ground water exploration, leak test as of dams and column scanning studies.

The further increase awareness among industries on the application of tracer technology, the Nuclear Energy Unit has and will hold two National Seminars for 1992, namely:

- i. National Seminar on Radioisotopes Applications in oil and gas industries which was held in 10 February 1992.
- ii. National Seminar on Tracer Applications in Sediment, Transport Studies, Hydrology and Industries, tentatively planned for October 1992.

RADIATION TECHNOLOGY

Malaysia participated actively in all the 4 activities i.e. Radiation Vulcanization of Natural Rubber Latex (RVNRL), Radiation Sterilization, Radiation Curing and Radiation Cross-linking.

Since the commissioning of the Gamma Irradiation in early 1989, more than 15,000 cubic metres of medical products such as surgical and examination gloves and containers for eye solution have been sterilized using this facility. Expansion programme for sterilization of medical products is being planned in anticipation of the full operation of the 3 MeV EBM at the Nuclear Energy Unit donated through JICA.

In the field of RVNRL, the pilot plant at the Nuclear Energy Unit is expected to be ready in early 1994. In the meantime the research group is conducting studies on economical and

suitable formulation for all the different types of latex which are supplied by 7 different companies.

Radiation curing of surface coating is another area which has great potential to be applied in Malaysian industries. Several R and D activities are being carried out using the Electron Beam Facility at the Nuclear Energy Unit. The EB machine donated by the Japanese Government through the bilateral co-operation arrangement between UTN-JICA was officially inaugurated on the 20 February 1992.

Radiation cross-linking of plastic is also considered to be a viable project in Malaysia, in view of the positive development of the petrochemical industries in Malaysia. Since the EB Technology is still new in Malaysia, the Nuclear Energy Unit has taken steps to increase awareness among the local industries and to promote the potential of the EB technology through organizing national training course and workshop. For 1992, the Nuclear Energy Unit is planning to hold the following workshops/training Courses.

- i. National Training Course on Industrial Sterilization of Medical Products-Sterility Assurance and Material Compatibility which will be held in June/July 1992.
- ii. National Workshop on Product Development Radiation X-linking of Wire and Cable Insulation, tentatively scheduled for December 1992.

NUCLEONIC CONTROL SYSTEM (NCS)

NCS was introduced into several paper mills in Malaysia by the Nuclear Energy Unit. There have been positive results in increasing quality and productivity and at the same time reducing raw material costs. Considerable interest was expressed in the possibility of using NCS in small and medium size paper mills.

With regards to the **New UNDP/RCA Project Proposal entitled "The Use of Isotope and Radiation to Strengthen Technology and Support Environmentally Sustainable Development"**, the Malaysian Government strongly supports and will contribute a sum of US\$50,000 to the implementation of the new RCA/UNDP project provided the IAEA, the UNDP and all the RCA member states agree to the implementation for the 1992-1996 cycle. Almost all the regional UNDP/RCA project proposals fit well into our Industrial Master Plan and National Action Plan for Industrial Technology and Development which were launched in 1987 and 1990 respectively.

It was agreed at the 13th RCA Working Group Meeting, Ho Chin Minh City March 1991, with the inevitable delay of commencing a new project to succeed the Phase II Industrial Project in mind, that the RCA should undertake a **Bridging Project** in 1992 which would consist of a part of the phase II Industrial Project with the purpose of not losing the momentum generated by the ten years activities of the Industrial Project. The Malaysian Government supports the **proposed bridging** activities for 1992.

With regards to the New Project Proposal for Australia entitled **IAEA/RCA Project on the Applications of Isotope and Radiation Technology to Regional Development with special references to Industry and Nuclear Medicine**, Malaysia supports and will participate.

MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES

Malaysia is participating in 4 projects in the field of Medical and Biological Applications of Nuclear Techniques, namely "Radioimmunoassay for Hepatitis B Diagnosis", and "Improvement of Cancer Therapy (Phase II), Computerized Dosimetry for Carcinoma of Cervix in Asian Countries", Radiation Sterilization of Tissue Grafts and Nuclear Instrumentation.

The project on **"Radioimmunoassay for Hepatitis B Diagnosis"** which is implemented by the University Hospital of Malaysia is progressing well. Malaysia received 3 types of reagents, namely HBsAg, HBcAb and HBsAb from China. The reagents are being evaluated and suitable suppliers for the project is being identified. Malaysia participated in the Regional Training Course on Diagnosis of Viral Infection Hepatitis by RIA which was held in Shanghai, China, 18 - 19 March 1991.

The project on **"Radiation Sterilization of Tissue Grafts"** is being implemented by the Nuclear Energy Unit (UTN) in collaboration with University Science of Malaysia (USM). A steady progress has been achieved, whereby amnion from human placenta is clinically produced for treatment of burn patients. A routine production of high quality radiation sterilized grafts will be established for wide use by various hospitals in Malaysia.

The co-ordinated research project on **"Improvement of Cancer Therapy (Phase II), Computerized Dosimetry for Carcinoma of Cervix in Asian countries"** is being carried out by

the National University of Malaysia. The progress of this project is rather slow due to the unavailability of compatible computer software.

In Nuclear Instrumentation project, Malaysia is participating in the project **Basic Care Preventive Maintenance and Co-operative Central of Nuclear Medicine** which started in 1989. UTN has played a major role in upgrading skills in the maintenance of nuclear instrumentation in the country, through training courses and demonstrations. Under this project, 380 nuclear instruments were repaired at the Nuclear Energy Unit Instrumentation Laboratory in 1991. Malaysia will host the Regional Training Course on Repair and Maintenance of MCA CARDS on 11 May - 5 June 1992.

STRENGTHENING OF RADIATION PROTECTION INFRASTRUCTURE

Malaysia is participating in 2 projects in the field of Strengthening of Radiation Protection Infrastructure, namely "Personnel Dosimetry" and a co-ordinated research project on compilation of Anatomical, Physiological and Metabolic Characteristics for Reference Asia man.

In the Dosimetry Intercomparison Programme Malaysia actively participated in the first and the second stage. Malaysia will continue to participate in the 3rd stage which will commence in March 1992 for a duration of 8 months. With regards to the regional Workshop on Personnel and Environmental dosimetry which will be held in Japan on 26-30 October 1992, Malaysia hopes to participate.

The Co-ordinated Research Project on **"Reference Asian Man"** which is being implemented by University of Malaya is not progressing as well as we anticipate due to some local constraints. Malaysia participated in the Research Co-ordinated Meeting on Reference Asian Man in India, on 8-12 April 1991.

AGRICULTURE AND FOOD

Malaysia participates in two projects in the field of agriculture and food, i.e. Food Irradiation and the CRP on the Use of Isotopes in the studies to improve yield and nitrogen fixation of common grain.

In **Food Irradiation (RPFI - Phase II)**, Malaysia has successfully implemented the pilot project and the process control. Presently, Malaysia is planning to carry out an Inter-country trial shipment studies on irradiated food imported from China.

Malaysia participates in the CRP on the Use of Isotopes in the **Studies to Improve Yield and Nitrogen Fixation of Common Grain Legumes**. This project is being implemented by the Rubber Institute of Malaysia in collaboration with the Nuclear Energy Unit (UTN). Under this project a promising line of *Arachis hypogaea* with superior performance in BNF and yield compared to the standard variety was identified. Study on N isotopic techniques for evaluation of BNF performance in groundnut has been carried out.

In 1991, Malaysia hosted a Regional Training Course on Sterile Insect Techniques and F-1 Sterility for Insect Control on 4-27 November 1991.

RESEARCH REACTOR UTILIZATION

Malaysia participates in a CRP on the **Use of Personnel Computers to Enhance Research Reactor Operation and Management**. The PUSPATI TRIGA Reactor is being used as a model for the simulation. Two modules have been developed as a basis for simulation software. The first module involves the video display structure and the use of keyboards to input the data required in the simulation. This module has been further developed to include real-time handling of different reactor parameters. The second module involves the mechanisms of reactivity changes during actual reactor operation.

Finally, the Malaysian delegation would like to reiterate its sincere appreciation to the IAEA and all the RCA member states for the successful implementation of the RCA programme. Malaysia supports the new RCA programme and looks forward to closer co-operation in the future.

COUNTRY STATEMENT - PAKISTAN

14th RCA Working Group Meeting

Tokyo, Japan, 24-27 March, 1992

Pakistan is very happy to participate in the 14th Working Group Meeting of RCA Member States being held at Tokyo, Japan. RCA is a valuable link between the IAEA Member States of South East Asia and the Pacific. RCA is completing 20 years of its successful existence and it is hoped that it will be extended for another period of 5 years. Pakistan has been associated with RCA activities since its inception and is glad to acknowledge that it has greatly benefitted by the RCA projects. Looking at the performance of the RCA, we believe that it will continue to play a very useful role in promoting peaceful uses of nuclear techniques in industry, agriculture, biology and medicine. Pakistan wishes to express its warm appreciation to the Agency and all the RCA Member States for their co-operation and assistance in RCA activities.

I would now like to discuss the activities carried out during 1991 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 just been completed. It is a matter of satisfaction that the objectives set forth for the Phase II of this project are generally considered to have been achieved to the desired level. The National Co-ordinator from Pakistan participated in the meeting of UNDP National Counterparts and Terminal Tripartite Review Meeting of the Regional Project at Jakarta, Indonesia in December, 1991. During 1991, following progress was made in different Sub-projects:

(1) Non-Destructive Testing (NDT)

PAEC is continuing training of personnel in NDT techniques and more than 40 organizations in the public and private sectors have benefitted from various courses in Ultrasonic Testing, Surface Methods, Radiography Testing, etc. Six such courses were organized during 1991 which were attended by more than 100 participants. Efforts are being made to launch a professional body solely devoted to NDT in Pakistan. During 1992 Pakistan plans to hold 4 courses under the same heading and in additional techniques of NDT such as Leak Testing, Acoustic Emission, Neutron Radiography, etc. The National Co-ordinator for NDT Sub-project participated in the Regional Board of Examination Review on NDT and Expert Advisory Group Meeting on Radiation Protection for NDT Radiographers, held at Jakarta, Indonesia from 23 January to 1 February,

1991. In addition, one senior scientist from Pakistan participated in the Regional Workshop on Weld Defect Sizing Using NDT at Tokyo, Japan from 30 September to 4 October, 1991; one scientist and one technician participated in the Regional Model Qualifying Examination in NDT Testing Radiography level 3 at Kuala Lumpur, Malaysia in October, 1991; and one senior scientist attended Regional Workshop on NDT Examination of Non-Metallic Material in November, 1991 at Bangkok, Thailand.

(2) Tracer Technology

The activities under this Sub-project included, application of Tracer Technology in Paper Industry to determine mixing time of rosen in pulp chest, overall density profile of the critical portion of a refinery atmospheric distillation, estimation of mercury inventory, build up and wear measurement in pipelines, and determination of density profile of an acetic acid distillation column.

One scientist from Pakistan participated in the Regional Training Course on Tracer Application in Industry, held at Jakarta, Indonesia in November, 1991. It is proposed to hold a National Executive Management Seminar on Application of Nuclear Techniques in Industry during 1992.

(3) Radiation Technology

The IAEA Research Project on Radiation Cross-linking of Wires and Cables is in progress. A Radiation Testing Laboratory has been set up under the project and the IAEA provided an expert mission for help in making the equipment/facilities operational. An IAEA expert visited Pakistan for a month in December 1991 - January, 1992. The National Co-ordinator for Radiation Technology Sub-project participated and presented a report at the Fifth National Co-ordinators Meeting held at Takasaki, Japan in May, 1991. One scientist from Pakistan attended the National Training Course on Radiation Curing held in Australia from 18 February - 1 March, 1991, and another scientist attended a Regional Training Course on Electron Beam Radiation Technology held at Shanghai, Peoples Republic of China from 26 August - 6 Sept., 1991.

(4) New UNDP/RCA Project Proposal

With regard to the New Project Proposal for UNDP funding ICP-5 (1992-1996) entitled "The Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development", Pakistan supports the proposal as discussed in the 13th RCA Working Group Meeting held at Ho Chi Minh City, Viet Nam and hopes that the Agency will continue its efforts in getting the UNDP funding for the 5th cycle of the ICP.

(5) Project Proposal on the Application of Isotopes and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine

The Australian proposal for an IAEA/RCA Project on the 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/RCA Regional Industrial Project and the proposed new UNDP/RCA project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development, which is expected to be funded by UNDP in 1992. 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 major objectives of the project have been completed and a country report was presented by the National Co-ordinator at National Co-ordinators' Meeting held at Colombo, Sri Lanka from 14-18 October, 1991.

Pakistan was identified as one of the countries for the supply of radioimmunoassay reagents in the region for co-ordination in EQAS. A new advanced software being developed at INMOL for EQAS data processing will be made available to IAEA for distribution to EQAS co-ordinating centres in the region. These two activities will become exclusive responsibilities of the Member States.

(2) RIA for Hepatitis B Diagnosis

The first meeting of the RCA project on Diagnosis of Hepatitis B by RIA was held at Colombo, Sri Lanka from 21-24 October, 1991 which was attended by the National Co-ordinator and results of evaluation of RIA reagents supplied by IAEA from China for three analytes Hbs Ag, anti Hbs, and anti Hbc were provided. The objective of this study is to identify a suitable source in the region for supply of reagents. This aspect of the study is to continue during 1992 with additional supplies of reagents from China. Simultaneously prevalence of HBV among high risk groups is to be studied. One scientist from Pakistan participated in the Regional Training Course on HBV Detection Techniques, held at Shanghai, Peoples Republic of China in March 1991. A National Co-ordination Meeting was held at INMOL in October 1991 in which project work plan and requirements of the project were discussed.

(3) Imaging Procedure for the Diagnosis of Liver Diseases (Phase II)

Liver images from 42 patients were sent to NIRS Japan for further evaluation. Half of the liver images from "selected" participating countries have been received and will be evaluated and interpreted by various Nuclear Physicians and Sonologists in Pakistan. The liver Ultrasonograms and Scintigrams from Japan were interpreted in Pakistan and are now being sent to NIRS Japan. The Principal Investigator of the project attended the First Research Co-ordination Meeting on Evaluation of Imaging Procedures for the Diagnosis of Liver Diseases held at Bandung, Indonesia in February, 1991.

(4) Improvement of Cancer Therapy (Phase II)

Two Nuclear Medical Centres in Pakistan are participating in this CRP on Computer Assisted Planning and Dosimetry in Radiotherapy of Carcinoma of Cervix. At NORI Islamabad a total of 80 patients were registered with cancer cervix and these cases were accounted for 6.7% of all the cancer cases registered at the Institute. Dosimetry in radiotherapy of the cervix was carried out according to the protocol recommended by the IAEA. The treatment of the patients was carried out both by external radiation and also using intracavitary therapy. Complete response was observed in 48% patients while 37% patients showed partial response after 6 months. The PC based computer has recently been given to NORI Islamabad by the Agency. One of the major emphasis is to make intercomparison of treatment plans using the PC based planning system and the TP-11 computer.

At INMOL Lahore 30 patients have been included in the study and since the software for the PC has not been received from the Agency, it is too early to give comparison.

Two scientists from Pakistan have been nominated for Training Workshop for the Physicists scheduled to be held at Chandigarh, India during April, 1992.

(5) Radioaerosol Imaging for the Diagnosis of Respiratory Diseases.

At the end of the 3 years study, last Research Co-ordination Meeting was held in Singapore in February, 1991 in which the Principal Investigator participated. The results of the studies conducted in 10 participating countries indicated interesting results obtained in the permeability studies concerning lung function in which very little information was available. In view of this the Agency has extended the research contract for one more year in which at least 20 healthy subjects will be tested for permeability lung function during next 6 months.

(6) Care and Maintenance of Nuclear Medicine Instruments

This project concentrates on research and development in the methods for basic care, preventive maintenance and operative control of nuclear medicine instruments. Ten laboratories in Pakistan are participating in this programme with INMOL Lahore as the national co-ordinating centre. The national nuclear medicine instrument inventory was prepared and submitted to the Agency and according to the programme half yearly inventory is being updated. A programme has been prepared for preventive maintenance implementation for which audio-visual aids were received from the Agency.

The Second Research Co-ordination Meeting on Maintenance of Nuclear and Related Equipment in Medicine was hosted by Pakistan at INMOL Lahore during April, 1991.

(7) Quality Control of Advanced Nuclear Medicine Equipment

This project is the part of CRP on Quality Control of Advanced Nuclear Medicine equipment in Asia. The programme of this project was to carry out regular inspection visits to Nuclear Medicine Departments and perform quality control measurements, to check and evaluate the results, to perform acceptance tests on new nuclear medicine equipment, and to train the users on quality control procedures. Eleven laboratories in Pakistan are participating in this programme in which Regular Quality Control tests were performed by the users and the results were evaluated.

The first Research Co-ordination Meeting on Quality Control of Advanced Nuclear Medicine Equipment in Asia was held at Bangkok, Thailand in April, 1991 in which the Co-investigator of the project attended. The Principal Investigator is participating in the Regional Training Course on the Use of Computers in Nuclear Medicine at Sydney, Australia in March, 1992.

C. AGRICULTURAL PROJECTS

(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. Post Irradiation (0.1 kGy) commercial storage at 20°C and ambient-shade condition for potatoes and onions increased their marketable life for 6 and 8 months. Transportation of these vegetables in wooden-crates proved better than jute-bags in reducing rotting. Textural measurements after transporting them over a distance of 800-1500 Kms indicated that deterioration of texture was

more in unirradiated than in irradiated samples. Marketing of Irradiated vegetables through a Federal Organization, Agriculture Storage and Marketing Limited, was attempted with mixed response. Gas Chromatographic separation of volatiles revealed wide variation in number and concentration of flavouring components between irradiated and unirradiated spices.

The principal Investigator attended the Second Research Co-ordination Meeting of Asian Regional Co-operative Project on Food Irradiation at Jakarta, Indonesia, in July, 1991.

(2) Improvement of Grain-legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen

During last year, 20 chickpea advanced mutants/cultivars and two reference crops i.e. barley and wheat were sown to screen for high yield and disease resistance with high nitrogen fixation capabilities. Thirty three Rhizobium leguminosarum biovar viceae have been characterized on the basis of their utilization of different carbon sources, intrinsic antibiotic resistant pattern and their effectiveness on different leguminous hosts. A field experiment to select highly effective strains of Rhizobium leguminosarum on lens culinaris is in progress. The introduction of entire β -glucuronidase (GUS) operon cloned from a natural Escherichia coli into Rhizobium leguminosarum biovar viceae is in progress. This GUS-marked rhizobial strain will be used as a tool for studying plant-microbial interactions. The results of the project were presented in the last Research Co-ordination Meeting which was held in Chiang Mai, Thailand from 27th May - 2nd June, 1991 by the Co-Principal Investigator. One scientist from Pakistan attended a UNDP/IAEA/FAO Regional Workshop on Rhizobium Technology in BNF (3-14 June, 1991), followed by an International Training Course on Modern Methods for the Study of Rhizobium, held at Chiang Mai, Thailand in June 1991.

(3) New Project Proposals

Pakistan is interested in participating in the following 3 New Project Proposals:

- (i) A Regional Technical Co-operation Project to Develop Strategies for Improving Animal Production and Health in Asia.
- (ii) F-1 Sterility for Controlling Caterpillar Pests of Horticulture and Field Crops.
- (iii) Sterile Insect Techniques to Protect Fruit and Vegetables from Destruction by Tropical Fruit Flies.

D. RESEARCH REACTOR BASED PROJECT

(1) Research Reactor Utilization

Under the CRP on the Application of Personal Computers to Enhance the Operation and Management of Research Reactors, a personal computer-based system has been developed for specialized information on radiation data from radiation monitoring channels installed at various locations in the reactor building of PARR-I at PINSTECH. The system performs on-line acquisition of radiation signals, processes the data, and gives real-time graphic display. It provides the operator and reactor users a quick overview of the radiation levels throughout the reactor hall. As the next phase of the use of personal computers in reactor operation, the system is being extended to determine the performance evaluation of nuclear and process channels in the reactor instrumentation system.

One engineer and one scientist from Pakistan participated in the Regional Training Course on Computer Application in Reactor Control and Calculation, held at Jakarta, Indonesia from 29 November to 19 December 1991. Another scientist participated as a lecturer in this Training Course.

E. ENERGY BASED PROJECTS

(1) Nuclear Power Project Planning and Implementation

Two engineers from Pakistan participated in the Regional Training Course on Nuclear Power Pre-Project Activities and Manpower Development, held at KAERI, Daejeon, Republic of Korea from 7-25 October, 1991. This course provided the participants with an overview on the technical, economical and organizational problems which are central to the formulation of nuclear power programme strategies.

(2) Energy and Nuclear Power Planning

Pakistan is organizing a Regional Training Course on Power System Expansion Planning, which will be held in Lahore from 26 April to 4 June, 1992. The local sponsors for the Course are WAPDA (Water and Power Development Authority) and the PAEC. Provision of computers and other facilities for the Course are being finalized in consultation with the Agency. Out of the 5 lecturers/resource persons from Pakistan, 2 are from within PAEC.

F. RADIATION PROTECTION PROJECTS

(1) Strengthening of Radiation Protection Infrastructure

Studies on supplementary investigation on the dosimetric characteristics for ceric cerous, red acrylic red perspex dosimeters were carried out in collaboration with Pakistan Radiation Services (PARAS). The characteristics for the above dosimeters were studied and compared.

In addition the Centre participated in an International Dose Assurance Service (IDAS) of the IAEA for dose intercomparison under practical conditions. Deviation recorded were within acceptable range for all dose checks. One scientist from Pakistan participated in the Regional Training Course on the Basic Techniques of Radioactive Protection, held at Tikai Mura, Japan in October, 1991.

(2) Compilation of Anatomical, Physiological and Metabolic Characteristics of Reference Asian Man/Woman in Pakistan

Under this project, data collection is in progress on height, weight, chest and head circumference for all age groups ranging from 5-50 years of both sexes from various ecological areas of Pakistan. So far data on 18,742 persons have been collected from urban and rural areas of the country. Work on other parameters of anatomical, physiological and metabolic characteristics is in progress. One scientist from Pakistan participated in the Regional Workshop on the Development Training Techniques and Methods of Instruments in Radiation Protection, held at Sydney, Australia in February, 1992.

(3) New Project Proposals

Pakistan is interested in participating in the following 3 New Project Proposals:

- i) Control of exposures in High Natural 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.

G. RENEWAL OF RCA AGREEMENT 1992-1997

Since the existing RCA Agreement is due to expire in June 1992, Pakistan agrees in principle to the proposed extension in the Agreement for a further period of 5 years from 1992-1997. The present RCA Agreement should be the basis for the document to be renewed in June 1992. As regards extra-budgetary funding for RCA activities, Pakistan supports the view that contributions from Non-RCA Member States would be beneficial, provided no conditions are attached.

H. OTHER COMMENTS

- (1) Pakistan is providing training to the scientists from the region at its Nuclear Institute for Agriculture and Biology (NIAB) Faisalabad in agriculture and biology and would like to continue this co-operation so that other countries in the region could also avail this offer through TCDC.
- (2) Pakistan is keen to send its experts to the Member States for short duration as and when required. A list of the available experts has been sent to the Agency.
- (3) As regards the project on Research Reactor Utilization, Pakistan would like that emphasis be given to experiments on material structure examination and investigation of micro-structure defects in reactor materials. Programme for study on the stress and texture of materials be initiated to solve the problems faced by Industry.
- (4) Pakistan strongly supports the inclusion of the project on Nuclear Information under RCA. It can play a significant role in regional co-operation in the field of information exchange based on INIS System.
- (5) 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.
- (6) Pakistan is planning to organize a Workshop on Radon Measurements for Dosimetry and Applications in the Study of Geophysical Processes. This Workshop will be useful in exploring uranium resources, earthquake prediction and taming geothermal energy sources for the economic development of the developing countries. The Workshop is now planned from 9-16 February, 1993 and the Agency

is requested to provide US\$35,000 under RCA programme out of the total estimated expenditure of \$42,500.

In conclusion, Pakistan wishes to express its satisfaction with the implementation of various RCA activities so far. Pakistan fully supports RCA activities and has great desire to further promote regional co-operation in peaceful uses of nuclear energy. On behalf of Pakistan, I would like to thank the Government of Japan for hosting the 14th RCA Working Group Meeting and we look forward to continued co-operation under RCA.

PHILIPPINE COUNTRY STATEMENT*

14TH RCA WORKING GROUP MEETING, TOKYO, JAPAN
24-27 March 1992

On behalf of the Philippine Government let me present our compliments to the Government of Japan for hosting this 14th WGM.

1. NEW RCA AGREEMENT

We hope this should not be the last WGM we shall be having for we look forward to an extension of the RCA Agreement once the present one expires this June 1992. The draft of the Agreement as presented is agreeable to us.

As usual it is with pleasure to inform this Meeting about the development in the Philippines with respect to the activities under the present Agreement.

2. UNDP/IAEA RCA INDUSTRIAL PROJECT (RAS)

2.1 Nucleonics Control Systems

Several investments have been made in the application of isotopes and radiation in industry, specially for the Sub-project Nucleonic Control Systems (NCS). Updating of an NCS survey (done in December 1990) has been completed. An engineer from the National Steel Corporation attended the Regional Workshop on Nuclear Control Systems in the Steel Industry, in Tokyo, Japan from 28 August to 5 September.

2.2 Tracer Technology

In the Sub-project Tracer Technology, it may be noted that as a consequence of the participation of two key members of the national tracer group (NTG) at the group training at ANSTO, two activities have been initiated: the studies on termite tracing and the preparation of safety assessment analysis of tracer applications and of other services rendered by the NTG to requesting entities. In a related technical co-operation (TC) project, visits were made by an expert mission to several industrial firms in preparation for a tracer demonstration under the Regional Project. A follow-up visit will be held sometime this year once the demonstration site is firmed up.

2.3 Non-destructive Testing (NDT)

In this Sub-project six (6) national training courses were conducted in 1991; ET-1 and ET-2, SM-1, UT-1 and UT-2, and RT-2 involving 102 participants. For 1992 two courses were already completed: UT-2 and RT-2. More are being planned.

The certification of the National Certifying Body (NCB) under the Philippine Standard (PNS 146:1987) is a continuing process.

*Read by Dr. Carlito R. Aleta, Director, * PNRI/DOST

Under the Grandfather clause provision of the Standard, some 228 certificates were issued to 103 NDT practitioners. The certificates issued under this Grandfather clause are valid only for two years and/or for as long as the personnel stays with the same company, whichever is the shorter period. They must be recertified under the Standard.

Regular certification examinations were held for UT-2 and RT-2 on 27 September 1991 and 7 October 1991, respectively.

A local examiner participated in the Regional Qualification Examination for RT 3 in Kuala Lumpur, Malaysia on 21-25 October 1991. The results of this have not been officially communicated to the participating countries.

A National Advisory Committee for NDT has been organized to help the National Certifying Body in the policy-making and implementing activities of the NCB. The creation of the Committee is required in the Standard.

2.4 Radiation Technology

In this Sub-project in the area of radiation sterilization, PNRI has already submitted a proposal for the establishment of a radiation sterilization facility for UNDP funding. No progress is being made here, but interest has already been shown by a private group for putting up the facility.

The PNRI and the Bureau of Food and Drug (BFAD) of the Department of Health are working together towards the setting up of regulations on radiation sterilization. PNRI takes care of the rules and regulations governing licensing of gamma irradiators, while BFAD will take care of the good manufacturing practice (GMP) of the process.

BFAD participated in the Workshop on the Regulatory Aspects of Radiation Sterilization in Bangkok, Thailand in April 1991.

R & D on radiation sterilization of medical products, pharmaceuticals, tissues and bone grafts are continuing.

3. FOOD AND AGRICULTURE

3.1 Food irradiation Process Control and Acceptance

BFAD participated in the seminar on Harmonization of Regulations on Food Irradiation in January 1992. Irradiation studies are continuing spices.

Two (2) research contracts are being undertaken no. 6388/DP "Evaluation of Shelf Life and Quality of Mangoes Irradiated with Doses Required for Fruitfly Disinfestation-Simulated Commercial Trials" and No. 5944/DP "Use of Gamma Irradiation for Enhancing the Marketability of Selected Seafood and Agricultural Crops".

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

A participant attended the RCM held in Chiang Mai, Thailand from 27-31 May 1991 and the following Workshop on Rhizobium from 3-14 June 1991. It was the consensus to establish a regional isotope laboratory to which participating countries that do not have an N-15 analyzer can send their samples for analysis.

A project proposal entitled "Biological Nitrogen Fixation under Stress Environment" has been submitted. The proposal will be a collaborative work among three local research institutes: PNRI, the UP Los Banos Institute of Plant Breeding and the Bureau of Soils and Water Management.

Research Contract No. 5905/RO/RB involves screening of mungbean for ability to fix high acidity. First and second plantings were harvested. Chemical analyses are in progress.

4. MEDICAL AND BIOLOGICAL APPLICATIONS

4.1 RIA for Hepatitis B Diagnosis

The PNRI has organized a team that will participate in the project RAS/6/018 "Radioimmunoassay for Hepatitis B Detection". A national training course to train physicians and technicians in the principles of RIA for detection and etiology of the disease is planned this year. RIA kits for HBe and anti HBe have been received for trial.

4.2 Inhalation Imaging for Diagnosis of Respiratory Disease

The project counterpart is studying the possibility of using this technique for other lung diseases.

4.3 Radiation Sterilization of Tissue Grafts

There is now a plan to commercialize tissue grafts. One problem encountered is the lack of donors which results in a limited processing and production of tissues like bones and amnions. A more definite legislation is needed to resolve the problem.

4.4 Imaging Procedures for Diagnosis of Liver Diseases (Phase II)

Phase II of the study under Research Contract no. 5692/JN is in its second year. The study compares liver scan with ultrasound examination. A group of ultrasonographers and nuclear physicians will interpret the ultrasound films and the results of the nuclear study, respectively. The comparison will involve sensitivity and specificity in studying liver diseases using ultrasound alone or both.

4.5 Nuclear Instrument Maintenance

The Chief Scientific Investigator of a research contract on "Quality Control and Maintenance of Nuclear Instruments" attended the Second Formulation Meeting of RAS/4/008 "Maintenance of Nuclear Instruments" at ANSTO, Australia on 24-28 February 1992.

This project is very important in sustaining quality of instrumentation performance.

4.6 Radiation Therapy

The research contract no. 5984/RO/JN entitled "Introduction of Computerized Dosimetry and Database in the Radiation Therapy of Cancer of the Cervix in the Philippines" is being undertaken at the Jose R. Reyes Memorial Medical Center. Twenty five (25) patients with cancer of the cervix have undergone radiotherapy: nineteen (19) using low dose rate and six (6) patients using high dose rate. Treatment planning of both groups of patients have been undertaken using the existing minicomputers and NAPC-based treatment planning system. Actual dose measurements have been performed using TLDs placed in the rectum and bladder catheter during the process. Variation between the measured and computer calculated doses was up to 26%. Follow-up of patients are being undertaken to assess short and long-term effects of radiation and correlate this with those calculated by computers. More patients data are needed.

5. RADIATION PROTECTION

5.1 Radiation Protection Infrastructure

We look forward to a second formulation meeting to draw up plans for the next five years. We have participated in the following: (a) RTC on National Infrastructure for Radioactive Waste Management, Indonesia, 21 October to 1 November 1991; (b) RTC on Safety Aspects in the Industrial Applications of Radiation Sources; (c) WS on the Development of Training Techniques in Radiation Protection, Australia, 16-27 February 1992; and (d) TC on Determination of Radionuclides in Food and Environmental Sample, Tokyo, Japan, 2-31 March, 1992.

5.2 Compilation of Anatomical, Metabolic and Physiological Characteristics of Reference Asian Man

The research contract on this project is expected to be completed in October 1992. The work being done is focused on sorting out available data in accordance with the required protocol of the project.

5.3 Intercomparison of Personnel Dosimeter

The Philippines participated in the first intercomparison and had done so again in the second intercomparison.

5.4 Survey and Control of Exposures in High Natural Radiation Areas.

The Institute has started a national radon survey of dwellings and selected underground mines.

6. RESEARCH REACTOR AND ENERGY BASED PROJECTS

The Philippines participates through the research contract no. 6049/RB entitled "Incorporation of Computers in Research Reactors Instrumentation Systems for Data Monitoring and Analysis. Development of software is in progress. The computer hardware will be connected to the PRR-1 instrumentation after the appropriate electrical isolation circuits have been fabricated.

7. NEW UNDP/RCA PROPOSAL ON THE USE OF ISOTOPES AND RADIATION TO STRENGTHEN TECHNOLOGY AND SUPPORT ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT.

The Philippines has favorably endorsed this proposal to UNDP and is awaiting to hear of any developments during this Meeting.

7. AUSTRALIAN PROPOSALS

The Philippines had earlier signified interest to participate in the RCA proposal from Australia. (Letter to Mr. Noramly bin of 4 December 1991).

8. CONCLUSION

In closing let me state that participating in this regional co-operation agreement has been very productive for the Philippines in terms of new knowledge and skills gained, fields that had been conquered and ready to be conquered, harmonization of activities, and at the personal level goodwill established among the various participating members.

It is also noteworthy to mention the initiatives being undertaken by the Government of Japan for a regional co-operation which is intended to supplement and/or complement the activities of IAEA/RCA. As a matter of fact only a few weeks ago four areas for co-operation have been identified: research reactor utilization, agriculture (Sterile Insect Technique), nuclear medicine and public acceptance in nuclear energy.

Let me reiterate an earlier statement that should a new RCA Agreement be forged for the next 5 year cycle, the Philippines would like to host the next WGM sometime in March 1993.

Thank you for your attention.

Fourteenth RCA Working Group Meeting

Tokyo, Japan, 24-27 March, 1992

COUNTRY STATEMENT - SRI LANKA

Mr. Chairman, Distinguished delegates and other participants,

1. INTRODUCTION:

First of all let me congratulate you, Mr. Chairman, on your selection to the Chairmanship of this 14th RCA Working Group Meeting. I would also express the appreciation and thanks of the Government of Sri Lanka to the Government of Japan for hosting this meeting. It is most appropriate, that Japan which has rapidly developed to be a leading nuclear industrial country not only in the Asia and Pacific Region, but also in the world, and has made a significant contribution to the RCA activities, should host this meeting in the 20th anniversary year of the RCA.

Sri Lanka which has been a party to the RCA since 1972, notes with satisfaction the success which regional co-operation has achieved in meeting the goals of the RCA to promote and co-ordinate co-operative research, development and training projects in nuclear science and technology through the sharing of the regional resources, including facilities, equipment and expertise, and the pooling of knowledge and close communication between scientists. From modest beginnings, the activities under the RCA now cover practically all aspects of nuclear science and technology, ranging from nuclear power planning to the application of nuclear techniques in food and agriculture, industry, medicine, water resources development, research reactor utilization, radiation protection and safety, and nuclear instruments maintenance and repair. Sri Lanka has benefitted from most of these activities by way of awareness, development of skilled manpower and some facilities, and applications of the knowledge to solution of national problems.

The success of the RCA activities must be attributed to the careful programming, identification of specific priority problems common to participating countries, the planning of time schedule for activities and their implementation through net-works of national co-ordinators and their periodical meetings. It can be confidently said that the RCA, its activities, strategies and management methods serve as an excellent example for other spheres of regional co-operation aimed at the transfer of skills for economic and social development.

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 destroying the environment. The Government has recognized that the application of modern science and technology, and this includes Nuclear Science and Technology is essential for achieving its stated objectives. The Government has also recognized the value of regional co-operation which will help to maximize the effective utilization of available regional centers of excellence and expertise in meeting our country's needs for

manpower training, research and development in the field of nuclear science and technology; **Sri Lanka therefore fully supports extension of the Regional Co-operative Agreement for a further period of 5 years.**

2. INDUSTRIAL APPLICATIONS:

Sri Lanka is gratified to note that the UNDP/IAEA/RCA Industrial Application project has successfully completed its second 5 year phase, achieving its goals of increasing the use of nuclear technology in regional industries for enhancing industrial productivity and competitiveness. It is noted that the project which cost about 20 million U.S. dollars has already resulted in capital investments of about 200 million U.S. dollars in nuclear facilities and equipment by regional industries in the participating developing countries, mostly in the private sector. It is also noted that these investments, which were mainly on radiation processing facilities and nucleonic control systems, were in countries where the institutions responsible for atomic energy had already established demonstration or pilot scale facilities with IAEA or UNDP assistance. Sri Lanka has benefitted from the UNDP/RCA industrial applications project through creation of national awareness of the potentialities of radiation processing, NDT, tracer methods and nucleonic control systems and training scientists in these fields.

A national capability for training and for providing services to industry in NDT has been developed, and a NDT Society has been established. About 300 persons have been trained in NDT courses at levels I & II with the help of experts under the RCA project.

Problems have been identified in various industries (e.g. Cement, Paper, Petroleum, Tyre, Ceramics, Steel) which can be solved by using tracer techniques. This technique has already been successfully used for testing leaks in oil pipelines in the petroleum industry at a recent regional demonstration in Colombo by a team of experts from China under the RCA programme.

Research and Development in Sri Lanka on radiation vulcanization of natural rubber latex has shown that the process merits commercial application. It is hoped that with IAEA/UNDP technical assistance a multipurpose Cobalt-60 irradiation facility would be set up in the near future for RVNRL, sterilization of medical supplies (including human tissue grafts) and food irradiation, in accordance with the findings of a recent IAEA feasibility study.

The Sri Lanka Paper Corporation, on the basis of a feasibility study under the UNDP/RCA project plans to invest in a nucleonic control system for improving the quality of its products.

Sri Lanka places high priority on & fully supports the proposed new UNDP and Australian projects in view of the continuing need for further strengthening of activities in industrial applications and industrial safety.

3. MEDICAL APPLICATIONS:

Medical Applications have been amongst 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 radioimmuno 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 Cobalt-60 Brachytherapy System.

Sri Lanka has been actively participating in the RCA projects on Radioimmunoassay of Thyroid related hormones and Hepatitis-B, and hosted regional meetings of National Co-ordinators in these projects in Colombo in October 1991. Sri Lanka has also participated in the RCA projects on Optimizing Treatment Methods in Cancer of the Cervix and Radiation Sterilization of Human Tissue Grafts.

It is gratifying to note that the projects on Thyroid Hormones has successfully achieved its objectives of reducing the cost per patient analysis from U.S. \$2.50 to U.S. \$0.10 - 0.25, increasing analytical reliability and developing capability for local reagent production. This is a significant contribution to Sri Lanka's in-vitro diagnosis activities under which some 75,000 samples have been analyzed over the period 1985-1991.

To lower the incidence of viral hepatitis-B following blood transfusion, a screening programme for hepatitis-B positive blood that uses RIA has been introduced with IAEA assistance at the Central Blood Bank in Colombo. Since 1983, about 175,000 blood samples have been analyzed and about 0.2% donors have been detected as carriers of Hepatitis-B positive. No infected blood is now being transfused. The RCA project on Hepatitis-B recently initiated will have a considerable impact on public health with the introduction of cheaper and more reliable RIA methods.

Under the project on Cancer of Cervix, about 400 new cases undergo treatment each year. With the improved treatment methods, disease free survival of treated cases over a 3 year period has been observed to increase from 26% to 66%.

Trained personnel and laboratory facilities are now available for radiation sterilization of human tissue grafts, but due to the lack of a Cobalt-60 irradiator, it has not been possible to provide the acutely needed tissue bank services. Sri Lanka hopes that through participation in continuing activities under the RCA project on this requested under the IAEA programme for technical co-operation in 1993/94, it would be possible to set up a national tissue bank for radiation sterilized tissue grafts which would be of great benefit to the country's health care services.

The development of a national capability for nuclear instruments maintenance and repair is an essential pre-requisite for all nuclear related activities and is a high priority

programme for Sri Lanka. Under the RCA project on this subject, national workshops have been held on quality control of nuclear medicine instruments and services provided on maintenance and repair.

Sri Lanka supports the continuation of the RCA projects on Hepatitis B, sterilization of human tissue grafts, and nuclear instrumentation and other topics. The new project proposed by Japan on the wider use of Brachytherapy System for treatment of cancer is also supported. Sri Lanka also supports the Nuclear Medicine Component in the new Australian Project proposed.

4. FOOD AND AGRICULTURE:

Under the RCA project on Food Irradiation, Sri Lanka has prepared draft regulations, made preparations for carrying out consumer acceptance studies on irradiated spices sent by India and China. Some R&D on spice irradiation has shown that considerable reduction on bacterial and fungal infestation is achieved by irradiation up to 10 k. grays without change in the volatile oil components of cardamom and nutmeg. Similar studies are being made on pepper, cloves and cinamon. It is envisaged that commercialization of spice irradiation, which is a major export commodity, offers much promise. This can only be achieved if the plans to establish a multipurpose Co-60 irradiation facility under the IAEA technical co-operation programme for 1993/94 are realized.

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. Recently, a national workshop was held on Nitrogen-15 analysis using the Optical Emission Instrument provided under an IAEA technical co-operation project. An IAEA expert helped in the training of 15 local scientists. It is hoped that with this local capability to carry out N-15 analysis, the project will make better progress.

The new proposals on the use of Sterile Insect Technique (SIT) for the Control of Insect Pests in vegetables and fruits, and on animal health and nutrition merit consideration and are of interest to Sri Lanka. The possibility of initiating a regional project using the SIT for control of Malaria and Filaria mosquitoes which is a serious problem in Sri Lanka is proposed for serious consideration. As the budgetary requirements for the proposals on SIT are very high, it may be prudent to consider a modified approach with limited objectives, to begin with. The previous projects on animal health, nutrition and reproduction have given good results of practical application to Sri Lanka, and continuation of this activity with clearly defined objectives would be welcome.

5. RADIATION PROTECTION:

Sri Lanka places high priority on the development of infrastructure for radiation protection activities as this is an essential prerequisite for all nuclear related projects. Measures have

been taken for the revision and updating of national regulations. A workshop on radiation protection was held late in 1991 for medical physicists, technicians and nurses with IAEA assistance. Similar workshops are planned in 1992 for medical doctors, and for scientists engaged in industrial applications. Personnel Monitoring Services (film badge) have been strengthened and it is hoped to introduce TLD System. However, in view of the high cost of TL dosimeters, this may not be practicable. Sri Lanka would welcome efforts to make these available cheaper through RCA. The RCA training courses on various aspects of radiation protection have been invaluable and these should be continued. A capability for radiation dose calibration still remains to be established. Sri Lanka plans to set up a programme for environmental radioactive monitoring.

The proposed new projects on radon exposures and high natural radiation areas are of particular interest to Sri Lanka and we support the proposals.

6. RESEARCH REACTOR AND ACCELERATION USE:

Sri Lanka has no major nuclear facility such as a research reactor or accelerator, nor do we envisage the need for establishing one in the near future. However, we would under the RCA, like to have access to such facilities in the RCA countries for our scientists to get exposed to their potentialities and conduct research and development on topics which may be of particular interest to Sri Lanka.

7. ENERGY PLANNING:

The RCA activities in energy planning have been of benefit to Sri Lanka even though we have no plans to set up a nuclear power plant. Sri Lanka is largely dependent on hydro-electric power for her electricity supply, but these resources are fast dwindling. Serious consideration has been given to coal as an option, but due to protests by environmentalists this has been deferred. The development of electron beam methods for cleaning oxides of sulphur and nitrogen in flue gases, while simultaneously converting these to nitrogen fertilizers can be a great impetus to the use of coal and other fossil fuels. This is an important component in the proposed new UNDP project on industrial applications of nuclear technology. Utilization the experience gained by our scientists under the RCA and other energy planning training courses, Sri Lanka plans to introduce both undergraduate and post graduate courses at our universities on energy planning for economics, and science and engineering students, in addition to periodical national workshops on the subject.

8. CONCLUDING REMARKS:

Sri Lanka would like to pay a tribute to the IAEA Secretariat for the efficient management and implementation of the RCA programme. In particular, special reference is made to the contributions of Professor Noramly, DDG, Technical Co-operation, who will be separating from the Agency in mid 1992. He has given strong and active support to the development of RCA programmes, and we will certainly miss him. We wish him all

success in his future endeavours. Finally, Mr. Chairman, we wish to reiterate our appreciation and thanks to the Government of Japan, for hosting this meeting, for the excellent arrangements, and for the lavish hospitality.

COUNTRY STATEMENT OF THAILAND

14TH RCA WORKING GROUP MEETING

24-27 MARCH 1992, TOKYO, JAPAN

Mr. Chairman,

It is my great pleasure to meet you and other delegations here in Tokyo to review the RCA activities over the past year and to discuss the peaceful uses of nuclear science and technology in Asia and the Pacific region.

On behalf of the Thai delegation, I would like to express my sincere congratulation to you on your unanimous election as the Chairman of the 14th RCA Working Group Meeting.

The importance of the use of nuclear energy for peaceful purposes for the economic and social development of many countries is universally recognized. An introduction of isotopes and radiation technology and other peaceful nuclear applications in food and agriculture, health and medicine, hydrology, industry, environment, etc., could play a vital role in this respect. The applications of many techniques are receiving particular attention because they are capable of saving energy and natural resources. Within the framework of the current RCA Agreement, the IAEA, UNDP and the Member States have been making substantial contributions through the promotion of regional co-operation. It is appreciated that the overall comprehensive success and progress of the activities bring highly practical benefits to the member countries and the region as a whole.

Thailand also gained its benefits in all projects under the framework of the agreement, such as in the medical and biological applications of nuclear techniques project, industrial project, agricultural project, and basic research. All areas are successfully applied in their field.

During the past year, there were several activities in our participation. I wish to take this opportunity to present the progress made in various activities in Thailand.

1. UNDP Regional Industrial Project

Tracer Technology

A national seminar and field demonstration on the use of tracer technology in petroleum and petrochemical industry was organized in the Eastern Seaboard Project area in the eastern part of Thailand with experts supported from the Project during 22-25 July 1991. There were 25 executives, engineers and scientists from petroleum, and petrochemical industries and researchers and lecturers from research institutes and universities. Three main topics for the field demonstration were the gas drier units scanning, flow rate measurement of natural gasoline pipe line and residence time distribution in mercury removal units.

Two sets of the scaler with its accessory were contributed by the Project for rendering tracer technique services to the industries.

Non-Destructive Testing (NDT)

One Regional Workshop on Non-Destructive Evaluation on Non-Metallic Materials, followed by a National Seminar on Non-Destructive Testing Appreciation for Managers were organized in Thailand during 11-15 November and 18-19 November 1991 respectively. There were 13 participants in the regional workshop and 33 participants in the national seminars.

Radiation Technology

Radiation Vulcanization of Natural Rubber Latex (RVNRL)

In 1991, large scale production of RVNRL has been tried using 300 kCi carrier-type gamma irradiator at Thai Irradiation Centre (TIC). The aim of the production is to develop the proper and simple irradiation technique suitable for large scale latex irradiation. Manufacturing of exam gloves from RVNRL using industrial scale production dipping machine has also been made. Preliminary study on the large scale production of RVNRL and manufacturing of exam gloves in factory production line suggest the possibility to promote the RVNRL and exam gloves production in commercial scale.

Radiation Sterilization

In conjunction with activities under the UNDP/IAEA Regional Industrial Project, three regional training courses on industrial sterilization with emphasis on quality control and sterility assurance had been held at OAEP since 1987. The third RTC was organized on 14-25 May 1990. A Regional Workshop on Industrial Sterilization - Regulatory Aspects was held at OAEP during 22-26 April 1991. The purpose of the workshop is to assess the status and development of regulations for industrial production and current industrial sterilization practices in RCA countries and to recommend to the RCA Member States further actions in harmoniously developing national standards for industrial sterilization.

Radiation Curing

The Department of Photographic Science and Printing Technology, Faculty of Science, Chulalongkorn University is intensively conducting research and providing technology transfer in this area. Currently, the Department has adequate potential to expand its research horizons in UV curing which contributes technological know-how to the printing personnel. The UV curing unit received from the project is an important tool for operation of this programme.

Radiation Treatment of Sewage Sludge

Research and development in radiation treatment of sewage sludge and waste water has been carried out by OAEP in collaboration with other government institutes and universities for many years. Bilateral Agreement has been made between JAERI and OAEP since 1989 under the title of "Sludge Pasteurization and Upgrading by Gamma Radiation".

Nucleonic Control Systems (NCS)

Thailand was selected to be the training and demonstration centre on the use of NCS in coal processing at Mae Moh Lignite Mine of the Electricity Generating Authority of Thailand (EGAT) in Lampang. Due to incomplete calibration of COALSCAN-3500 equipment by the supplier at the Mae Moh Mine, the activity on this project in 1990 and 1991 was to be postponed.

The IAEA Expert Mission on COALSCAN - 3500 Calibration Procedure was arranged to Mae Moh Mine in Lampang to review the coalscan calibration procedures and lignite analysis data. The technical recommendations were made by the experts. The additional recommendations for the IAEA to provide support on the trainings of EGAT personnel were also made.

2. Medical and Biological Applications of Nuclear Techniques

Radioimmunoassay of Thyroid Related Hormones

Thailand is one of three countries that was selected to be the External Quality Assessment Scheme (EQAS) Centre of the Region. There are 16 laboratories joining the centre for project utilization including Sri Lanka and Myanmar. At EQAS centre, the primary reagent can be produced with the lower cost and the analytical reliability of the technique can be improved.

Radioimmunoassay for Hepatitis B Diagnosis

There were 2 participants, one from Chulalongkorn Hospital and one from National Institute of Health, attending the Regional Training Course on Diagnosis of Viral Infection Hepatitis by Radioimmunoassay during 18-29 March 1991 in Shanghai, China. During 1991, the activities under the project was to test and compare the quality of the reagents received from China and to evaluate the result.

Radiation Sterilization of Biological Tissue Grafts

During 1991, the Bangkok Biomaterial Centre (BBC) has procured bones and tissue from 32 dead donors. The allografts were 70 of deep frozen long bones, 1,034 of freeze-dried chipped bones, 14 for cartilage and 3 for patellar tendon. Other freeze-dried soft tissue allografts processed were 30 of fascia lata, 89 of dura mater and 200 of amniotic membrane. The number of allografts recipient were 136 from 23 hospitals treated by 59 surgeons.

All of allografts were sterilized by gamma irradiation at dose 25 kGy at Thai Irradiation Center of OAEP. It took about 2 hours of driving and 24 hours of irradiation. Such a long period of time might deteriorate the deep frozen allografts, a gamma irradiator was requested to IAEA for allografts sterilization. Discussion about the type of irradiator and place to install the irradiator was made with the IAEA Technical Officer.

The seminar on quality control and standards in irradiation of tissue was organized in Bangkok on 21-24 January 1992. There were 4 scientific visitors from the region received. The director of BBC participated in the Third Meeting of Asia-Pacific Association of Surgical Tissue Banking in 1991.

Nuclear Instruments Maintenance

The activities carried out under this project in the past year include the followings:

- Collecting and updating of information regarding the medical units and the instruments available.
- Evaluation and analysis of data collected.
- Supporting in the identification of minor breakdowns and cause of problems.
- Arrangements for the availability of simple spare parts and electronic components needed by the medical units.
- Development of the teaching aid.
- Organization of training courses and seminars.
- and etc.

3. Food and Agriculture

Food Irradiation Process Control and Acceptance (RPFI III)

The control of rice and mungbean irradiation processing and marketing trial has been conducted in Thailand. Dose mapping run for 50 kg. commercial packages of rice and 50 kg. green mungbean using industrial, carrier type gamma irradiator at the TIC was conducted. Optic-Chromic, FWT-70-40M and Gammachrom YR were used as dosimeters. Sensory acceptability evaluation on irradiated rice and green mungbean at the various dose and control have been tasted.

The Workshop on Public Information of Food Irradiation was organized in Bangkok during 27-31 May 1992 to provide factual information on food irradiation to the members of national press corps and consumer organizations of the RCA member countries. There were 15 participants attending the Workshop.

Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen

A regional workshop on Rhizobium Technology was organized at the Biological Nitrogen Fixation Resource Centre in Bangkok during 3-14 June 1991. There were 12 participants from 8 member countries participating the workshop.

The second 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 organized in Chiang Mai. There were 8 participants attending the Meeting.

4. Research Reactor, Basic Science and Energy Planning

There was one Physicist from OAEP attending the Regional Training Course on Computer Application on Research Reactor Control and Calculation during 29 November to 19 December 1991 in Serpong, Indonesia and one Engineer attending the Regional Training Course on Nuclear Power Pre-project Activities during 7-25 October 1991 in Taejon, Republic of Korea.

Thailand supported the new project namely, Nuclear Techniques in Development of Advanced Ceramic Technologies.

5. Radiation Protection

Personal Dosimeter Intercomparison

The practical Personal Dosimeter Intercomparison and information exchange is very useful of the quality assurance of radiation protection measurement. OAEP has joined another RCA member states participating this programme and plans to be the center of personal dosimeter intercomparison in Thailand.

Comments

UNDP Regional Industrial Project

The radioisotopes and radiation applications in industries in Thailand under the project comprises tracer technology in industry, non-destructive testing, radiation technology and nucleonic control systems. Normal procedures for implementation of the project are creation of awareness of potential benefits, initiation of research and development by using nuclear technology and establishment and encouragement of collaboration among the atomic energy institute and industries. The promotional and training activities within the RCA Member Countries also created awareness of benefits and opportunities in the technology. The activities have led to increase the interest of public and private investments. Several industrial projects have initiated and operated successfully and some area at the stage of consideration. The total investments in nuclear industrial equipment in Thailand amount to approximately 74.1 million US dollars.

Concerning the new UNDP/RCA Project Proposal namely the Use of Isotopes and Radiation to Strengthen Technology and Supports Environmentally Sustainable Development, as far as we know, the environmental problems are global problems for which responsibility must be solved. In this context, Thailand strongly support the proposed project and will continue her action role in participation the project with the financial supported by UNDP.

Medical and Biological Applications of Nuclear Techniques

For the Radioimmunoassay of Thyroid Related Hormones Project, the EQAS center should be continued to carry on its activities under the IAEA's technical assistance.

Radiation Protection

Thailand supported the new project under the Radiation Protection Project.

In conclusion, Thailand wishes to express our fully support the RCA activities for promoting regional co-operation in the peaceful uses of the nuclear technology.

Finally, I would like to join other delegates to express our thanks to the Government of Japan for hosting this important meeting and for the warm hospitality extended to us during our stay in Japan.

Thank you.

COUNTRY STATEMENT - VIETNAM
14th RCA WORKING GROUP MEETING
24-27 March 1992
Tokyo - Japan

Mr. Chairman,
Distinguished Delegates, Ladies and Gentlemen,

This is the second time in the RCA history all delegates from RCA States have been shown the traditional hospitality of Japanese people and the excellent arrangement of the Government of Japan in organizing RCA Working Group Meetings.

Vietnamese delegation wishes to express its happiness and deep gratitude to the Government of Japan for having hosted this 14th RCA WGM, especially for its strong commitment to support RCA activities technically and financially as well.

Understanding the enormous benefits having been brought to and evident progress in the co-operation between RCA Member States in the field of Nuclear Science and Technology Vietnam remains its involvement in RCA activities and enhances its contributions to the RCA's cause. This expresses Vietnam's willingness towards the extension of the Regional Co-operative Agreement for another five years, which will be expiring in June 1992.

In Vietnam, under the framework of the RCA, the following activities have been carried out in accordance with the National Programme on Peaceful Uses of Nuclear Energy.

I. UNDP/RCA Regional Industrial Project

As a part of the national commitment to the RCA, Vietnam has joined RCA countries to support the new project proposal which is the continuation to the progress of the UNDP/RCA Industrial Project having terminated last year. At this meeting, we would like to renew our support for the Australian project proposal on "the applications of isotopes and radiation technology to regional development with special reference to industry and nuclear medicine", which we found very useful for RCA Members at present time.

Regarding to the project implementation, Viet Nam has deployed all four sub-projects:

1. Non-Destructive Testing

New NDT Laboratories set up; the establishment of NDT Qualification and Certification Board in Ho Chi Minh City; the number of trainees sponsored under the RCA framework including expert missions, all have significantly contributed to the public awareness and acceptance of the application of NDT techniques to various sectors of the country's industry.

To promote the dissemination of NDT techniques, 5 NTC's and 1 NW were organized; 10 register-inspection groups have applied radiographic and ultrasonic testings to control qualitatively over 100 industrial objects. Nevertheless, the present NDT network has not come on line as intended. Its efficiency is to be improved.

2. Tracer applications

In co-operation with the IAEA project assisting Vietnam in studying bedload transport of sedimentation, the Tracer Group of Dalat Nuclear Research Institute (NRI) has used tracer techniques to investigate bridging procedure at Haiphong port. The tracer group of the Centre for Nuclear Techniques in Ho Chi Minh City used tracer I-131 to determine the effective porosity of aquifer, to measure the moisture movement for studying the groundwater recharge in Dong nai province.

In general, tracer groups in Vietnam have not been broadly established and have not well enough equipped. But we would say that tracer techniques have found their very first awareness in the society.

3. Nucleonic Control System (NCS)

NCS began to draw attention from the paper industry in Vietnam. Following the move of Tanmai paper mill, Baibang paper mill is preparing to rehabilitate its NCS systems and to introduce new ones. A state-funded project has supported these activities. This has got positive response from the paper industry.

The NCS group of the Centre for Nuclear Techniques in Ho Chi Minh City has involved in repairing, renovating NCS system for Hatien cement plant.

Concerning training, 8 persons participated in RTCs, RW, Scientific Visits and REMS during 1989-1991.

4. Radiation Technology

The Dalat NRI has followed up activities in radiation in radiation vulcanization of natural rubber latex; radiation cross-linking of polyethylene; radiation grafting MMA on to RVNRL for the test production of shoe heels and other radiation sterilization such as for enzyme products, biological monitors.

Hanoi Irradiation Centre has effectively used its Co-60 source to sterilize an amount of carrier used for nitrogen fixation for 5000 ha of soil. The centre has also supported other projects using radiation technology.

25 persons were sent abroad to participate in RCA activities; 2 expert missions were held to advise concerned institutions about technical problems.

II. MEDICAL AND BIOLOGICAL APPLICATIONS

1. Nuclear Medicine

Under the framework of the project RAS/7/003, the quality improvement of sterilized tissue grafts has been brought out between suppliers and end users. With the close co-operation with Hanoi Irradiation Centre, the Hanoi laboratory for tissue preservation has successfully provided sterilized bones and skin for clinical trials of 132 cases from which 32 cases were of bone grafting. All these cases were reported from various hospitals without complications.

The workload of participating laboratories has been increased due to the reduction of assay cost gained from the project RAS/6/011. The remarkable point is that project RAS/6/018 can inherit achievements of the project RAS/6/011. We would like to emphasise on the vital importance of the project RAS/6/018 for Vietnam. In our country, viral hepatitis ranks third in the most common infectious diseases, in which Hepatitis B counts for about 40%. Under this project we have received 2 automatic bead washers, a National Seminar on this field was organized. Concerning kit procurement we would like to have an effective network for kit supply in the region.

Through implementing projects RAS/6/016, RAS/4/008 and RAS/4/012, Dalat NRI and Ho Chi Minh CNT have well supported medical centres in providing radioisotopes and nuclear equipment maintenance and repair. We would like to concentrate on not only repair and maintenance, but also up-gradation. Bearing this in mind we fully support the new project proposal on spare parts services.

Concerning Radiation Protection, Vietnam has participated in project RAS/9/006; Personal dosimetry intercomparison programme and RCA CRP on Reference Asian Man. We have paid more attention on legislation of Radiation Protection and Nuclear Safety. In this aspect, NTC's, seminars were organized by VINATOM for technicians and officers in and outside of VINATOM.

III. FOOD AND AGRICULTURE

Vietnam has willingly participated in all RCA followed-up activities related to Food and Agriculture, namely, RAS/5/021, RAS/5/022, CRP. E4.30.02.

We would like to express our supports for project proposals on:

- Nitrogen fixing trees for increasing soil fertility, crop and fuel wood production.
- Use of the Sterile Insect Techniques to Protect Fruit and Vegetables from Destruction by Tropical Fruit Flies
- Development of strategies for improving animal production and health in Asia.
- Control of the diamondback moth in SEA using F1 Sterility.

To meet the objectives of the RCA projects on Food and Agriculture, VINATOM has co-ordinated with agricultural sectors in using nuclear techniques to improve crop yield, animal production and health. Hanoi Irradiation Centre is going to treat dried fish, rice and onions on ton-scale,

serving to food preservation. Marketing tests and food irradiation regulation are underway to be carried out.

IV. RESEARCH REACTOR AND ENERGY BASED PROJECT

Implementing the national programme on Reactor Utilization which is, fortunately, coincident to the RCA objectives proposed in this field, Vietnam has gained significant achievements in utilizing its unique research reactor, such as, in activation analysis; silicon transmutation doping; measuring reactor parameters. With the assistance of the TC project VIE/4/010 we are in action of upgrading our reactor and modernizing its control system. In another words, our activities have met both the objectives of the project.

Vietnam would be very pleased to participate in the project on Accelerator based Technology if it will be approved by the Agency.

Mr. Chairman,

To conclude this statement, Vietnam would like to reiterate its support to the RCA extension. Vietnam joins other RCA countries to urge UNDP for funding the new UNDP/RCA project proposal on "the use of isotopes and radiation to strengthen technology and support environmentally sustainable development". By the same token, we would like to express our high appreciation to donor countries for bridging activities in this transmission period.

RCA ACTION PLAN 1991-93

Project No.	Title	1991	1992	1993
RAS/0/013	Energy and Nuclear Power Planning	X	X	X
RAS/0/015	Development of TCDC in Asia and the Pacific	X	X	X
RAS/4/008 CRP: E1.10.06 E1.10.07	Nuclear Instrument Maintenance	X	X*	X
RAS/4/011 CRP: F1.20.09	Research Reactor Utilization	X	X	X
RAS/5/020 (RAS/89/044) CRP: D6.10.13	Food Irradiation Process Control and Acceptance	X	X	X
RAS/5/021 (RAS/89/045) CRP: D1.40.04	Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen	X	X	X
RAS/5/022	Control of Tropical Plant Viruses +	X	X	X
RAS/6/011	Radioimmunoassay of Thyroid Hormones	X**		
RAS/6/016	Use of Computers for Technetium-99m Imaging		X**	
RAS/6/018	Radioimmunoassay for Hepatitis B Diagnosis		X	X
RAS/7/003 CRP: E3.10.04	Radiation Sterilization of Tissue Grafts	X	X*	X
RAS/8/061 RAS/8/062 RAS/8/064 (RAS/8/?)	UNDP Industrial Project (RAS/86/073) Industrial Project (Japanese fund) Industrial Project (Australian fund) New UNDP Project	X** X X	 X X X	 X X X
RAS/8/066	Isotope Techniques in Hydrology +	X	X**	
RAS/9/006 CRP: J3.20.01	Strengthening of Radiation Protection Infrastructures	X	X*	X

CRP: E1.30.06	Imaging Procedures of Diagnosis of Liver Disease (Phase II)	X	X**	
CRP: E3.30.08	Improvement of Cancer Therapy (Phase II)	X	X	X
CRP: E1.3.05	Radioaerosol Imaging for Diagnosis Respiratory Diseases	X	X**	
CRP: F2.20.09	Tc-99m Generator for Low Power Reactors	X**		

* Project Formulation Meeting

** Project ceased

+ Unfunded

RCA BUDGET AND BUDGET ESTIMATES 1991 - 92

Project No.	Title	Fund Source *	BUDGET US \$K	
			1991	1992
RAS/0/013	Energy and Nuclear Power Planning	TC ROK ADB	78.85 (25 -)	79.3 -)** 90
RAS/0/015	Development of TCDC in Asia and the Pacific	TC IND ROK CPR	35.4 50 25 50	37.2 50 25 25
RAS/4/008 CRP: E1.10.06 E1.10.07	Nuclear Instrument Maintenance	TC Reg	45.4 21.6	236.5 -
RAS/4/011 CRP: F1.20.09	Research Reactor Utilization	TC IND CPR Reg	86.55 (25 (- 27.3	87.9 -)** 25)** -
RAS/5/020 (RAS/89/044) CRP: D6.10.13	Food Irradiation Process Control and Acceptance	UNDP CPR	160.5 -	165.5 -
RAS/5/021 (RAS/89/045) CRP: D1.40.04	Improvement of Grain-Legume Rhizobium Symbiosis to fix Atmospheric Nitrogen	UNDP	224.3	245.4
RAS/5/022	Control of Tropical Plant Viruses	Unfunded***	103.3	-
RAS/6/011	Radioimmunoassay of Thyroid Hormones	TC	+	-
RAS/6/016	Use of Computers for Technetium-99m Imaging	AUL	-	100
RAS/6/018	Radioimmunoassay for Hepatitis B Diagnosis	TC	118.1	120.8
RAS/7/003	Radiation Sterilization of Tissue Grafts	TC	38.85	236.5

Project No.	Title	Fund Source*	BUDGET US \$K	
			1991	1992
RAS/8/061 RAS/8/062 RAS/8/064 RAS/86/073	UNDP Industrial Project	UNDP TC JPN AUL IND CPR ROK	637.7 154.8 290 250 (25 (25 (-	- 135.9 290 250 25)** -)** 25)**
RAS/8/066	Isotope Techniques in Hydrology	Unfunded***	87.2	148.75
RAS/9/006 CRP: J3.20.01	Strengthening of Radiation Protection Infrastructure	TC JPN AUL IND CPR Reg	11.7 72 50 (25 (25 25.45	6 72 50 -)** -)** -
CRP: E1.30.06	Imaging Procedures for Diagnosis of Liver Diseases (Phase II)	JPN	30.9	-
CRP: E3.30.08	Improvement of Cancer Therapy (Phase II)	JPN	58.9	58.9
CRP: E1.3.05	Radioaerosol Imaging for Diagnosis of Respiratory Diseases	Reg	6.5	-
Total			2653.1	2361.9

* Note these figures are estimates only. In particular they do not imply commitment by donor countries.

** Administered through RAS/0/015 and not included in budget total.

*** Not included in budget total.

+ This project terminated in 1991.

Notes

UNDP - United Nations Development Programme

ADB - Asian Development Bank

TC - Technical Assistance and Co-operation Fund

Reg - IAEA Regular Budget

JPN - Extra-Budgetary contribution from Japan

AUL - Extra-budgetary contribution from Australia

CPR - Extra-budgetary contribution from the Government of China

IND - Extra-budgetary contribution from India

ROK - Extra-budgetary contribution from the Republic of Korea

PROPOSAL FOR SUPPORT FROM THE GOVERNMENT OF JAPAN ON A NEW RESEARCH COORDINATED PROGRAMME ON ADVANCED BRACHYTHERAPY TECHNIQUES FOR CANCER MANAGEMENT.

1. Proposed Title of Programme:

Advanced techniques in brachytherapy of cancer.

2. Scientific Background:

The development of after-loading techniques which effectively eliminate the exposure of staff to radiation, has resulted in a general resurgence of interest and an increasing role for brachytherapy in cancer management. Various clinical applications now include Interstitial, Intracavitary, Intraluminal, and Surface moulds. The availability of a wider range of radionuclides in miniaturized forms, of varying properties and energies, coupled with the generally improved technologies for imaging procedures and after-loading, now permits better dose distribution within the target volume. This is further aided by the availability of cheap personal computer based treatment planning systems.

It is also technically possible to carry out brachytherapy at different but suitable anatomical sites within the body. These include head, neck, bladder, prostate, penis, cervix, lungs, eyes, oesophagus, skin and breast. Techniques vary and the applications are based on various concepts in physics and radiobiology including different dose rates. (low, medium and high).

The IAEA had been involved in the past in only intracavitary brachytherapy of carcinoma of the cervix where considerable experience was gained from the recently concluded brachytherapy project in Egypt.

Furthermore as part of the proposal for the IAEA Medium Term Plan (MTP), considerable emphasis is to be placed on the encouragement and development of brachytherapy facilities in the developing countries. The experience obtained from the CRPs on the use of computers in radiotherapy planning and dosimetry therefore form a logical base for further work in this field. It will be useful to explore the potentials for introducing high -dose -rate brachytherapy techniques with its many possible advantages such as:

- increased cost effectiveness,
- possibility of treating many more patients,
- possibility of outpatient treatments,
- increased patient comfort from shorter treatment time,
- reduced nursing requirements,
- guaranteed dose delivery to target volume in a shorter time etc.

3. Scientific scope and proposed programme goals.

To promote the use of brachytherapy in management of cancer at various suitable sites in the body. In particular to assess:

(a) Different brachytherapy regimes (BRT) using varying dose rates, eg.

LDR = low dose rate = 0.4-2G /hr.

MDR = medium dose rate = 2-12G /hr

HDR = high dose rate = 0.2G /min.

(b) BRT in combination with external teletherapy (XRT) in

(1) Intracavitary treatments.

(2) as booster to external radiation eg. in breast cancer.

(c) The role of BRT in palliative cancer care eg. intraluminal BRT in oesophageal or bronchial cancer.

(d) BRT in combination with other modalities eg. hyperthermia, surgery or chemotherapy. etc

It is proposed that a training workshop will be held at which current techniques especially in interstitial brachytherapy would be taught to enable wider participation by the developing countries. The vast pool of experience and expertise available in Japan would be required for the successful implementation of this project.

An International symposium with about 150 participants would be arranged in 1996 following which a priced publication would be produced. The possibility of producing a TECDOC may also be considered.

The proposed CRP will increase the awareness and encourage wider use of brachytherapy in the developing countries. It should also assist the evolution of basic standards for techniques, dosimetry and reporting system through the aid of personal computer based treatment planning systems. The CRP will also afford unique opportunities for international collaborative clinical trials which may help shape the future direction of brachytherapy in clinical radiotherapy.

4. Possible Participating Institutes.

A global CRP is foreseen. 10 research contracts and 10 agreements are anticipated. The participating institutes will have to satisfy some criteria for eligibility.

5. Implications for the future :

(a) Estimated duration of the programme.

1993 -1997 (5 years)

(b) Meetings planned and source of funds :

1. Consultant's meeting.

2. Three research coordination meetings.

Extrabudgetary sources from the Government of Japan will be requested up to the tune of \$1.1 million dollars.

6. Estimated programme costs :

(a) 10 Research contracts \$50,000 per annum X 5 =\$250,000.

(b) Three RCM at \$50000 per meeting =\$150000.

(c) Training workshop (3weeks) at Japan =\$60000.

(d) Equipment support. \$500000.

(e) International symposium 1996. 150 participants.

(f) Publication of proceedings of symposium \$25000.

(g) TECDOC publication.

(h) Miscellaneous \$50000.

SUMMARY

The Meeting noted that all the reasons given in the letter dated 4 March 1992 for referring the proposal back to UNDP Field Offices and the respective Government were puzzling. Before and during the preparation for MAC-5, there had been clear indications by both the developing RCA Member States and the prospective donors Australia and Japan of their very strong interest and support of all RCA Member States in the new project proposal. UNDP Field Offices had been approached by the Governments and been told of the high level of importance attached to this regional initiative. At MAC-5 this strong support continued to be voiced and oral and written support had been presented to the UNDP directly.

The meeting agreed that since there had only been only a 6 week gap between MAC-5 and the letter it was not possible that such continued strong support from RCA Member States would suddenly evaporate. The meeting noted that the project proposal was formulated with a very high level of regional interaction and input and the resulting proposal had embodied the invited views of all RCA Members on their highest priorities in their area of application of nuclear technology to subjects of significant regional importance. The Meeting confirmed that the total package of activities presented in the proposal was an integrated and cohesive approach that carefully combined the past investments in nuclear technology and new techniques, giving not only a substantial increase in the technology skill base but also greatly assisting in the firm implantation and self sustainability of technology already transferred.

Dealing with specific matters, the Meeting noted that some points in the fourth paragraph of the letter to UNDP Field Officers was incorrect. Although both Australia and Japan had announced their support to the new proposal, no contribution has been confirmed. That would be most inappropriate since the final structure of the project has not been agreed with UNDP. Decisions on the phasing and amounts of donor countries contribution had still to be made and would have to conform to their specific government policies. Assumptions in the PFF had been made that the contribution from Australia would be US\$1.0 million (not US\$1.5 million as in the letter) and Japan US\$1.5 million (not US\$1.0 million as in the letter). In the same document US\$4.25 million was assigned to UNDP. In no way were there funds on this scale from Australia and Japan available for a "bridging" programme as suggested in the letter. There is a "bridging" programme for RCA in 1992 but this is made up from the slippage of 1991 extra-budgetary activities. The bridging programme has been achieved at no additional cost to Australia and Japan as was resolved at the 1991 RCA Working Group Meeting in Ho Chi Minh City, Viet Nam.

OFFICIAL CLOSING

BY MR. SADAYOSHI KOBAYASHI ON BEHALF OF MR. YOSIYUKI SADAOKA,

DIRECTOR OF NUCLEAR ENERGY DIVISION,

MINISTRY OF FOREIGN AFFAIRS,

JAPAN

Distinguished representatives of the IAEA,
Distinguished delegates from the RCA Member States,
Distinguished observers from Mongolia,
Ladies and Gentlemen,

On behalf of all the members of our Organizing Committee, I wish to express our sincere gratitude to all of you who have so actively participated in this 14th RCA Working Group Meeting. I now extend best wishes to all of you as you return home and to work.

On behalf of all the participants, now I must bid farewell to Professor Noramly for whom this is the last RCA meeting to attend in the capacity of Deputy Director General in charge of technical co-operation, and I thank you, Professor Noramly, for your active involvement in and dedication to the RCA.

Now I have the duty and the honour to declare the 14th RCA Working Group Meeting officially closed.

