

International Atomic Energy Agency

**EIGHTH WORKING GROUP MEETING
OF RCA MEMBER STATES**

**SEOUL, REPUBLIC OF KOREA
25 APRIL TO 2 MAY 1986**

R E P O R T

REPORT

EIGHTH RCA WORKING GROUP MEETING 29 APRIL - 2 MAY 1986

KOREA ADVANCED ENERGY RESEARCH INSTITUTE REPUBLIC OF KOREA

<u>CONTENTS</u>	<u>PAGE</u>
1. Inaugural session;	1-3
2. Election of Chaiman;	3
3. Adoption of Agenda;	3
4. Summary Report of 14th Meeting of Representatives of RCA Member States;	3-5
5. Agreement Establishing Asian and Regional Co-operative Project on Medical and Biological Applications of Nuclear Techniques;	5-6
6. Progress Report on UNDP Industrial Project;	6-11
7. Review of the Operation of the Regional Co-operative Project Agreement;	11-13
8. Special Lecture;	13
9. Country Statements;	13-14
10. New Project Proposals;	15-17
11. Technical Reports;	17-22
12. Closing Session;	23

ANNEXES

- I. List of participants;
- II. Opening Remarks, Mr. Noramly bin Muslim, Deputy Director - Technical Co-operation, IAEA;
- III. Inaugural Address, Mr Won Ki Kwon, Vice Minister, Minister of Science and Technology;
- IV. Welcoming Remarks, Dr. Pil Soon Han, President of KAERI;
- V. Agenda;
- VI. Report, UNDP Project Co-ordinator;
- VII. UNDP Industrial Project - Phase II;
- VIII. Time-table for Renegotiation of RCA agreement;
- IX-XVIII. Country Statements;
- XIX-XXIV. New Project Proposals;
- XXV-XXXVII. Technical Reports.
- XXXVIII. 1986 RCA Action Plan
- XXXIX. 1987 RCA Cost Projection

MEETING REPORT

The 8th Working Group Meeting of RCA Member States was held during April 29-May 2, 1986 at the Korea Cancer Center Hospital of the Korea Advanced Energy Research Institute by the invitation of the Government of the Republic of Korea.

The meeting was attended by 19 delegates from Australia, China, India, Indonesia, Japan, Malaysia, Pakistan, Sri Lanka, Thailand, Republic of Korea, as RCA Member States and three delegates from the IAEA led by the Deputy Director General, Department of Technical Cooperation. A list of the participants is attached as Annex I.

1. Inaugural Session

1.1. Opening remarks: Mr. Noramly bin Muslim, Deputy Director General, Head of Department of Technical Cooperation, IAEA.

The Deputy Director General (DDG-TC) formally welcomed all delegates to the Eighth Working Group Meeting on behalf of the Director General (IAEA). He expressed appreciation to the Government of the Republic of Korea for hosting the meeting and complimented the staff of the Korea Cancer Center Hospital for the excellent arrangements. He formally welcomed the delegation of the People's Republic of China to their first Working Group Meeting a fully fledged member of RCA. He also welcomed Mr. Peter Airey as the RCA Coordinator from this year and appreciated of the work of his predecessor Mr. M. Kobayashi.

The DDG-TC highlighted the major activities during 1985 and reminded delegates that the IAEA looks to advice from this meeting to ensure that maximum benefit is accruing to member states from resources allocated to RCA activities. The full text is attached as Annex II.

1.2 Inaugural Address: Mr. Won Ki Kwon, Vice Minister, Ministry of Science and Technology

Vice Minister Kwon expressed a warm welcome to all delegates on behalf of the Republic of Korea and formally inaugurated the Eighth RCA Working Group Meeting. He pointed out that Korea firmly believes that RCA is "an important vehicle to accomplish regional cooperation through collaboration among member states for the purpose of upgrading nuclear application techniques". Vice Minister Kwon referred to the importance of Korea's nuclear power programme and to the impressive progress being made in the medical and industrial application of radioisotopes. He pointed out that Korea could act as a bridge between advanced and developing countries through closer interaction with the IAEA. The full text of his address is attached as Annex III.

1.3. Welcoming remarks: Dr. Pil Soon Han, President of KAERI

On behalf of the host organization, Dr. Pil Soon Han extended a cordial welcome to all delegates and guests. He congratulated Dr. Noramly bin Muslim on his appointment as Deputy Director General and Head of the IAEA's Department of Technical Cooperation. He pointed out that KAERI was pleased to host the Working Group in 1986 which is a significant year being the 30th Anniversary of the establishment of the IAEA, the 15th Anniversary of the initiation of the RCA and the year in which Korea will host the Tenth Asian Games.

Dr. Han emphasized the importance of nuclear power to the Republic of Korea and explained some KAERI's efforts to achieve self-reliance in nuclear power technology. He further stressed the needs of exchange of nuclear information and experiences between countries in the Region to generate mutual benefit.

Dr. Han briefly described the work of the Korea Cancer Center Hospital and expressed the hope that the hospital might be used as a tool by which RCA might contribute to the application of nuclear techniques in human health. The full text of Dr. Han's address is attached as Annex IV.

2. Election of Chairman

It was moved by the Delegate from Pakistan that Commissioner Byong Whi Lee be elected Chairman of the Working Group Meeting. The motion was seconded by the delegates from Australia and Sri Lanka and passed unanimously.

3. Adoption of Agenda

An amendment to the provisional Agenda suggested by the delegate from Korea was accepted. At the request of member states an additional discussion on Phase II of the UNDP (RCA) Industrial Project was scheduled on 30 April. The Agenda, as modified, is attached as Annex V.

4. Summary Report of the 14th Meeting of Representatives of RCA Member States

The summary report was presented by the RCA Coordinator. He referred delegates to the official report of the meeting which was included in the Background Papers and summarized progress on the following actions arising out of the meeting.

(a) RCA Working Group Meetings

The Agency noted with gratitude the offer by Sri Lanka to host the 9th RCA Working Group Meeting in Colombo, 1987, and the offer of the People's Republic of China to host the 10th Meeting in 1988.

(b) UNDP Industrial Project : Evaluation Mission

The four man evaluation mission visited Thailand, Bangladesh, Indonesia, Republic of Korea, Malaysia and the Philippines between 16 January and 5 February 1986. A draft report has been forwarded to the Agency by UNDP.

(c) Nomination of technical experts and consultants from the Region.

This question was raised by the delegate from India. Professor Noramly reiterated the Agency's commitment to increasing the percentage of experts and consultants recruited from the developing world. He indicated that it is now policy within his Department to examine not only the technical qualifications of experts but their understanding of the countries in which they will be working.

(d) The status of delegations of donor countries to the UNDP Tripartite Review Meeting.

The delegate from Japan requested that donor countries be granted full member states at the Tripartite Review Meeting. The matter was discussed at the Agency's UNDP Project Task Force which referred the question to UNDP where it is now under consideration.

(e) Renegotiation of the Regional Cooperative Agreement
Please refer to section 7.

(f) Management of RCA

Professor Noramly outlined recent changes in the management structure within the Department of Technical Cooperation.

These included

- the shifting of the RCA Coordinator from the Department of Research and Isotopes to the Department of Technical Cooperation,

- the appointment of the RCA Coordinator as Project Officer for the UNDP Industrial Project, and

- the transferring of responsibility for other Regional Asian Projects to the RCA Coordinator.

(g) Medical and Biological Application Agreement.

Please refer to Section 5.

5. Agreement Establishing the Asian and Regional Cooperative Project on Medical and Biological Applications of Nuclear Techniques.

The RCA Coordinator pointed out that the Agreement was prepared in accordance with Article II Section 5 of the RCA Agreement (INFCIRC 167) and noted similar agreements for Phase I and Phase II on the Asian Regional Cooperation Project on Food Irradiation. The draft agreement was discussed at the 14th Meeting of Representatives of RCA Member States. Comments were received and assessed and final agreement was issued in Vienna on 20 February, 1986.

The delegate from Japan indicated that his Government has already notified the Agency of its formal acceptance and expressed the hope that other Member States accept the Agreement as soon as possible so that medical and biological projects can be further enhanced. The delegate from the Republic of Korea reported that his Government had notified the Agency of acceptance of the Agreement.

The delegate from India indicated concern that Article 5 might give the Agency authority to seek contributions from Member States not party to the Agreement without adequate consultation within the region. He suggested an amendment to the Article. Because of the possible legal implications of this proposal, the meeting Chairman recommended that the delegates from India and Japan confer privately. Discussions were held in the presence of the RCA Coordinator. As a result it was agreed that this question was satisfactorily addressed in Section 6 of Article II of the umbrella RCA Agreement. The Chairman congratulated the two delegations on the speedy resolution of this issue.

The delegate from Australia indicated that his Government welcomed the initiative of the Government of Japan in developing new project framework and is considering the scope and content of an Australian contribution to it. In their country statements, delegates from China, Thailand and Malaysia specifically expressed interest in the Agreement.

6. Progress Report on UNDP Industrial Project

6.1 Review of activities since the 7th RCA/WGM

A comprehensive progress report was made by the UNDP Project Coordinator. His report is attached as Annex VI.

During the subsequent discussion, the delegate from Japan raised the question of coordination between the Department of Research and Isotopes and Department of Technical Cooperation and suggested that the role of the Task Force might be expanded to include all RCA projects.

The question of the recruitment of experts was raised. Professor Noramly pointed out that the Agency recruited about 1500 experts in 1985 and that efforts will be made to increase the percentage of experts recruited from the Region because of their better understanding of the problems facing the countries in which they work. He requested recipient countries to carefully assess the value of the expert services to their needs. He reminded delegates that costs of their services are counted against the recipient country's credits with the Agency.

6.2. Review of activities during 1986

The UNDP Coordinator spoke to the 1986 work plan. The delegate from Pakistan confirmed that a National Executive Management Seminar on Radiation Sterilization of Medical Products would be held in Lahore 20-21 September.

The delegate from the Republic of Korea indicated that his Government would be hosting an Executive Management Seminar on the Radiation cross-linking of Wire and Cable during November, 1986.

The delegate from Japan expressed appreciation to Indonesia for supporting the Radiation Processing Sub-Project. He noted that efforts should be made to increase the utilization of the Electron Beam facility and recommended the seeking of industry involvement. He alluded to legal problems in importing wood products from, say Malaysia, into Indonesia for use at the facility.

The delegate from Indonesia indicated that he was enquiring into this matter. He added that a national seminar on Radiation Processing was held in Jakarta, March 1986. The participants included a number from the industrial sector. Invited speakers from the IAEA and Japan presented papers on a range of topics including the utilization and economic evaluation of electron beam machines for the surface coating of wood products.

The delegate from Malaysia noted that a barrier to the introduction of this technology was the cost of monomer which must be purchased from abroad. He enquired whether an R & D programme into monomer development might be supported by UNDP. The UNDP Project Coordinator pointed out that UNDP would not favour projects with a large R & D component but suggested that the Government of Malaysia might consider an application for an appropriate IAEA fellowship.

The UNDP Coordinator informed delegations that the Agency had received a draft report of the UNDP Evaluation Mission. The report is being used in the preparation of the report Phase II proposal. An official IAEA response to the report must await submission through the UNDP of the final report.

The delegate from Pakistan announced the installation of a 200KCi facility for the sterilization of medical products with provision for the irradiation of foodstuffs at a later stage. His Government is pleased to make this facility available for on the job training of scientists within the Region. The delegate sought a list of irradiation facilities, and information from the IAEA on assistance which can be provided in improving public acceptance of irradiated products.

6.3. UNDP Industrial Project - Phase II (1987-1991)

At the request of RCA Member States at the Tripartite Review Meeting, April 1985, Jakarta, the IAEA signified to UNDP intention to seek support for a Phase II of the UNDP Industrial Project. As a result, the UNDP despatched the Evaluation Mission (Refer Section 6.2) not only to assess the achievements of Phase I but also to identify the opportunities for Phase II.

To assist in the formulation of the Phase II proposal, the IAEA convened a Consultants Group Meeting, 24-27 March 1986, Vienna. On the basis of the recommendations of this meeting, the Secretariat prepared a background paper which is attached as Annex VII. The document outlines a work plan which would need a level of cash resources of US\$ 5.45M. over the five years (1987-91). This represents an upper limit of the resources which may be made available from UNDP and the existing donor countries to the UNDP Project. An attempt to compute in-kind support requested from participating Member States has also been made.

The IAEA would welcome comments and suggestions from Member States by 1 June so that they may be reflected in a Draft Project Document which will be forwarded to Project National Counterparts in time for further comment at the Tripartite Review Meeting, scheduled 17 July 1986, Bangkok.

The delegate from Indonesia announced that for Phase II of the Project, his Government again offers to host the UNDP Regional Office at BATAN, Jakarta. On behalf of UNDP, the IAEA as Executing Agency expressed gratitude to the Government of Indonesia for this offer. A key to the success of this project has been its regional management. During Phase II, efforts will be made to devolve as much decision making as possible to the Regional Office.

The delegate from Japan felt that too much emphasis was being placed on NDT although he acknowledged the important role of this technology to industrial development. This was supported by the delegate from Sri Lanka who expressed the view that an attempt was being made to compress eight years effort into five. A similar sentiment was expressed by delegate from Malaysia. The delegate from Australia considered that the nuclear component of NDT may not be sufficient to justify a dominant role in the UNDP project since most of the RCA countries are not involved in reactor construction. The DDG reminded delegates that the Agency will give priority to projects with a high nuclear component.

An opposing view was presented by the NDT National Project Coordinator for the Republic of Korea who had attended the recent NDT Coordinator's Meeting in the Philippines. He stressed the importance of NDT and its role in Quality Assurance in manufacturing industry. He recommended that NDT be considered as a separate project - not a sub-project within a multi-faceted programme of activities. He explained that this suggestion was simply designed to ensure management efficiency. He also raised the possibility of accepting non-traditional sources of funding into the project.

In response to these comments, the RCA Coordinator made the following points.

(a) Since the IAEA was presenting a proposal for the second Phase of an existing project, it may not be acceptable to UNDP to receive two separate proposals.

(b) the question of seeking non-traditional sources of funding is being considered by the Agency. However, in accordance with Section 6 of Article II of the umbrella Agreement, reference would need to be made to Member States before approaching any source outside the UN system.

The meeting endorsed the view that the NDT sub-project should be implemented within the framework of the UNDP Industrial Project.

The delegate from Pakistan agreed to forward a list of NDT National Training Courses, in which his Government would welcome IAEA/RCA involvement.

Support for the Tracer Technology sub-project was expressed by delegates from India and China. The delegate from India supported the concept of a sister relationship between more experienced and less experienced institutes within the Region.

The delegate from Japan supported continued activities in the Radiation Processing area. The delegate from India questioned whether support from the project could be obtained for the construction of an irradiation facility within the Region.

Reference should be made to the country statements for further details. The IAEA notes the endorsement of RCA Member States to its proposal to seek support from UNDP for Phase II of RAS/79/061.

7. Review of the Operation of the Regional Cooperative Agreement

The second extension of the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology is due to expire in 11 June 1987. It is essential that a new Agreement be in place by then if continuity of project activities subject to subsidiary agreements-and in particular extra budgetary contributions to these project activities - is to be assured.

The IAEA acknowledges the authority endorsed by the Working Group to negotiate a revised RCA Agreement in accordance with the timetable attached as Annex VIII.

In the ensuing discussion the delegate from Japan indicated that his Government would prefer a new type of agreement to avoid some current legislative problems. A working paper is in preparation. The delegate from Malaysia pointed out some inconsistencies in the operation of the Agreement.

The delegate from India commented that with the change in complexion of the programmes undertaken for the development of atomic energy in various Member States , RCA activities need to be suitably augmented. In this context his Government has suggested in the past the extension of RCA projects to regional collaboration in research and development for nuclear power, including mineral prospecting, power planning, operation and maintenance of power plants and related health and safety aspects.

In response, the delegate from Australia stated that his Government has reservations, at this time about the extension of RCA into nuclear power related projects. Australia considers that projects in the field of the medical, agricultural and industrial applications of radioisotopes and radiation technology are of value and interest to all Member States. The limited resources available to support RCA projects can achieve maximum benefit if focussed on these areas. In addition, it is open to any Member States to seek assistance from the IAEA technical cooperation program in nuclear power related areas.

The delegate from Japan generally supported the Australian position. The delegate from India responded that he is considering only a gradual introduction of the new activity. In particular, the Government of India is proposing that its contribution for 1987 be utilized in part for organizing a seminar/workshop in India on the Maintenance and Operation of Research Reactors.

8. Special Lecture: Dr. Chang Kun Lee, Nuclear Training Center -KAERI.

A special lecture entitled "Public Acceptance of Nuclear Power" was presented by Dr. Chang Kun Lee. He made an interesting, forceful, well illustrated and at times amusing presentation of the serious topic of problems in obtaining public acceptance of peaceful nuclear activities.

9. Country Statements

The following country statements are attached:

Australia	---	Annex IX
Bangladesh	---	Annex X
China	---	Annex XI
India	---	Annex XII
Indonesia	---	Annex XIII
Japan	---	Annex XIV
Malaysia	---	Annex XV
Pakistan	---	Annex XVI
Sri Lanka	---	Annex XVII
Thailand	---	Annex XVIII
Republic of Korea	---	Annex XIX

The Agency noted with gratitude a number of offers of assistance in the Country Statements which were not noted elsewhere in this report. For instance, the Republic of Korea is soon to construct a 500 KCi commercial irradiation facility . When operable it is proposed that the facility for regional training and demonstration activities.

The Government of Pakistan, cognizant of the important role of nuclear techniques in agriculture, biology and food irradiation reiterates its offer to share its experience at the Nuclear Institute for Agriculture and Biology (NIAB) at Faisalabad with other member states. Pakistan would also welcome sharing its experience in the field of nuclear medicine with RCA member states. The delegate from Pakistan expressed the hope that RCA will cooperate in supporting those member states where expertise exists but no regional centers have been established. This cooperation will help in bringing a uniform distribution of facilities within the Region.

10. New Project Proposals

The RCA Coordinator commented that a number of new proposals had been received, and it was most unlikely that all could be funded. He proposed to formally seek written expressions of interest from Member States for those projects for which there is widespread support at the Working Group Meeting. These responses would be expected in time for review at the General Conference Meeting.

10.1 Proposal for a WASP Users Workshop (Annex XX)

The Agency's WASP computer methodology is a tool for use in medium and longterm electrical generation expansion planning studies. The aim of the project is to review studies which have been made within the Region and to provide advice on the means of improving such studies, particularly as regards input data.

Support for the proposal was indicated by China, India, Indonesia, Malaysia, Pakistan, Sri Lanka and Thailand. Sri Lanka expressed willingness to host the first workshop.

10.2 Computer Treatment Planning in Radiotherapy (Annex XXI)

The aim of the project is to provide central radiotherapy departments in developing countries with computer systems for radiotherapy treatment planning.

The delegate from the Republic of Korea pointed out that 23 institutes offering radiotherapy exist within his country of which 90% use computer based treatment planning. Korea could therefore contribute to the program on the basis of experience.

The delegate from Japan expressed appreciation of this support. Subject to the availability of funding, Japan will support this activity. Support for the project was also forthcoming from China, Indonesia, Malaysia, Pakistan, Sri Lanka, and Thailand.

10.3 Intracavitary Radiation Therapy (Annex XXII)

The objective of the project is to disseminate intracavitary radiotherapy of the cervix cancer using a remote after-loading technique. A Regional Training Course on "Brachytherapy of the Uterus Cancer Using Manual and Remote after-loading Technique" has been organized at Kuala Lumpur, 6-26 October, 1986.

The delegate from India gave this project high priority as it would contribute to the introduction of a new treatment modality to many countries. Other expressions of support were received from China, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, and Thailand.

10.4 Introduction of Monoclonal Antibody Techniques to the Region (Annex XXIII)

The aim of the project is to bring an important frontier area of research in nuclear medicine to developing countries.

The delegate from Japan believed that the activity should first be introduced on a global basis through the Agency's Coordinated Research Programme. Support for the proposal was expressed by Republic of Korea and Thailand where a monoclonal antibody for malaria has been prepared.

10.5 Development of the INIS Capability in RCA Member States (Annex XXIV)

The aim of the project is to establish or improve the local nuclear information structure through local or regional means.

Professor Noramly raised the question of the guaranteed level of funding for this project. The delegate from Japan pointed out that although he supported this project and would do what he could to maximize his country's contribution

to RCA, there were significant domestic pressures on funding. Consequently, as far as questions of funding were concerned, he would have to adopt a neutral position on this and all new proposals.

General support for the project was expressed by India, Japan, Pakistan, and Thailand.

10. 6 Radiation Protection Infrastructure (Annex XXV)

The aims of the project are (a) to assess the needs for radiation protection within the Region and the levels of human and technical resources to meet those needs, and (b) to contribute to the building up of radiation protection infrastructure.

Support for this project was expressed by India, Indonesia, Republic of Korea, Malaysia, Pakistan, Sri Lanka, and Thailand.

11. Technical Reports

11. 1 The use of induced mutations for grain legume production (Annex XXVI)

The purpose of the coordinated research program is to combine the efforts of plant breeding institutions in developing better cultivars of various grain legumes using induced mutations.

The delegate from Pakistan reported success with the development of a chick pea variety (CM-72) which is resistant against blight disease and has a high yield potential.

Consideration is being given to a new CRP under the Agency's regular programme concerned with the improvement of nitrogen fixation yields.

11.2 Food Irradiation Project (RPRI II) (Annex XXVII)

The objective of the programme is to coordinate pilot/commercial scale experiments or specific application of food irradiation with direct participation of the local food industry to facilitate the transfer of technology.

The delegate from Japan recommended an Executive Management Seminar as an efficient mechanism of technology transfer. In response to his question, the delegate from Thailand presented a detailed report of public acceptance trials on irradiated foodstuffs. She explained that there was extensive prior consultation between representatives of consumer groups, food producers and regulators. The products (garlic, shallots and fermented pork) sold in supermarkets were well received. The delegate from Australia reported a campaign against current moves to approve certain irradiated foodstuffs for public sale. In China, a total of 8 irradiated foods have been approved for a marketing trial. The delegate from China offered the Shanghai Irradiation Center as a regional training demonstration center for food irradiation. Reference was made to a similar offer by the delegate from Pakistan in Section 6.2.

Dr. H.O. Cho from Republic of Korea presented a brief report on the Project Committee Meeting, the Research Coordination Meeting and the study tour in China.

This project is funded by the Government of Australia.

11.3 Nuclear Techniques to Improve Domestic Buffalo Production (Annex XXVIII)

The aim of this project is the improvement of the productivity of swamp and river buffaloes in the Asian Region by studying the interrelationships between nutrition, reproduction disease status and managerial practice. There are currently 14 research contracts and six research agreements.

11.4 Radiation Sterilization of Tissue Graft (Annex XXIX)

The aim of the coordinated research project is the development of radiation sterilization practices for suitable non-viable tissue grafts for safe clinical/surgical use in Member States.

The delegate from India pointed out that since the procurement of tissues can only be made from hospitals with post-mortem facilities, and since the volume of such tissues is small, a small irradiation facility could be provided at such hospitals for operating tissue banks.

The delegate from Pakistan suggested that Atomic Energy establishments were suitable for this work. The delegate from Thailand pointed out that in her country OAEP and hospitals handle this project.

11.5 Maintenance of Nuclear Instruments (Annex XXX)

The RCA Coordinator pointed out that the Agency places a high priority on this activity and is developing a Regional Project along the following lines.

(a) Member States will be requested to notify the IAEA of institutes responsible for maintaining Agency equipment.

(b) These institutes will be strengthened with training courses, expert visits etc.

(c) Instruments will be sent to the Center for maintenance from other national institutes

11.6 Nuclear Techniques for Toxic Elements in Foodstuffs (Annex XXXI)

The aim of the CRP is to obtain comparative data on the existing elemental concentrations in foodstuffs in various Asian

countries. A related Regional Training Course on the Application of Nuclear Techniques to Health Related Environmental Research was held in Sydney 28 April-30 May.

11. 7 Isotope Applications in Hydrology and Sedimentology
(Annex XXXII)

The project has contributed significantly to the introduction of an isotope hydrology capability to the region. The project is due to terminate in 1986. The optimum use of residual funds which were provided by the Government of Australia is currently being discussed. An IAEA/UNESCO Regional Seminar on the Application of Isotopes in Hydrology will be held in Jakarta June/July 1986. The delegate from Indonesia questioned whether a Research Coordination Meeting could be arranged in association with this meeting.

11. 8 Semi-dwarf Mutants for Rice Improvement (Annex XXXIII)

The aim of the CRP is to establish and make available by mutation breeding new sources of semi-dwarf plant type for lodging resistance in rice. Delegates were generally satisfied with progress.

11. 9 Improvement of Cancer Therapy (Annex XXXIV)

The aim of this clinical study is the use of a combination of conventional radiotherapy with chemical radio-modifiers and hyperthermia to improve radiation therapy techniques.

On the recommendation of the IAEA, the RCM scheduled for 1985 was postponed till 1986 and will be held in association with the WHO/IAEA International Symposium on Radiotherapy in Developing Countries. Instead, two expert missions visited the contract holders. The delegate from Japan suggested that the project be subjected to critical review as to the objective and methodology at the earliest possible occasion.

11.10 Nuclear Techniques for the Diagnosis of Tropical Parasitic Diseases (Annex XXXV)

The project seeks to evaluate the potential of existing immunoradiometric assays to detect parasite antigens in sera and urine of patients with filariarisis, schistosomiasis or malaria. Samples with patients with filariasis were assayed using RIA techniques with monoclonal antibodies supplied by the Walter and Eliza Hall Institute of Medical Research Mellbourne, and the Pasteur Institute, Lille, France.

Work on malaria was undertaken with a monoclonal antibody developed in Bangkok. The delegate from Pakistan questioned whether the programme could be extended for a Fourth Year.

11.11 Basic Science Using Research Reactors

This programme is supported by the Government of India. During the current year, two regional training courses are proposed :

(a) Summer course on Neutron Reactor Beams in the Study of Materials and

(b) Regional Training Course on RIA Techniques and their Clinical Applications. The former commences in June and has attracted 8 participants from the Region; the latter is scheduled to commence in September. Two Regional Training Courses are planned for 1987. One will be concerned with the Maintenance and Operation of Research Reactors, and the other will the Applications to Mecedine of Techctium-99m Generators and Kits.

11.12 Quantitative Procedure for Nuclear Medical Imaging Procedures for Liver Diseases (Annex XXXVI)

The aims of this project are quantitative evaluation of the performance quality of imaging instruments available in various countries in the region, and the evaluation of the interpretation of 116 representative clinical liver images from Japan by various physicians from the Region.

The project is reported to be proceeding very well although a problem of the design of liver phantoms was reported. The question of whether the program could be extended to include an intercomparison of sound imaging with RI imaging were raised. The recommendation of the RCM to prepare an atlas of representative liver images from the Region was outlined.

The program is being supported by a contribution from the Government of Japan.

11.13 Development of Tc-99m Generators using Low Powered Research Reactors (Annex XXXVII)

The aim of the CRP is to develop an appropriate technology for the preparation of Tc-99m generator system using low specific activity ($n-\gamma$) Mo-99. At present it is hoped to test following generator types :

- (a) Solvent extraction
- (b) Gel generators, and
- (c) Low temperature sublimation generators
(Developed in Hungary)

The delegate from Pakistan expressed interest in joining the project. Strong support for the continuation of the project was expressed by the delegate from India.

12. Closing Session

The RCA Action Plan (Annex XXXVIII) and the 1987 Cost Projection (Annex XXIX) were presented. The draft minutes were circulated and accepted after a number of agreed amendments. In his closing remarks the DDG congratulated delegates on a successful meeting and emphasized the Agency's commitment to furthering the ideals of the Regional Co-operative Agreement. In response, the Chairman, on behalf of NAERI thanked delegates for the contribution they made to the Eighth Working Group Meeting.

Annex I

LIST OF PARTICIPANTS

DELEGATES

Australia

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Mr. Jong Eun Chung
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Mr. Sang Hwa Lee
Head
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Dr. Sung Ryul Yoo
Head
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Division of Radiology
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Mr. Chang Hee Kim
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Dr. Day Young Park
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Dr. Jong Doo Lee
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Dr. Soo Yong Lee
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Dr. Duk Young Min
Associate Professor, Medical School
Hanyang University

Dr. Jeong Haing Oh
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Department of Ornamental Horticulture
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Mr. D.C. Kim
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National Institute of Health

Mr. S.B. Kang
Head
Department of Radiation Standards
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Dr. C.S. Koh
Professor
College of Medicine
Seoul National University

Mr. K.S. Ryu
Senior Researcher
Agricultural Sciences Institute
Office of Rural Development

Dr. N.H. Lee
Principal Investigator
Korea Advanced Institute of Science and Technology

Annex II

OPENING REMARKS

Noramly bin Muslim
Deputy Director General
Head of the Department of Technical Cooperation
International Atomic Energy Agency

His Excellency, Vice Minister of Ministry of Science and Technology, Mr. Kwon, Won Ki, President of KAERI, Dr. Han, Pil soon, Director of the Korea Cancer Center Hospital, Dr. Yun, Taik Koo.

Mr. Chairman, distinguished delegates and guests from RCA Member States, ladies and gentlemen.

On behalf of the Director General of the International Atomic Energy Agency, I welcome all of you to the Eighth Working Group Meeting of RCA Member States.

I would like to express our appreciation to the Government of the Republic of Korea hosting the meeting, and to compliment the staff of the Korea Cancer Center Hospital for the excellent arrangements.

At our last meeting in Lahore, Prof. Zifferero expressed the hope that it might soon be possible to welcome China as a full-fledged member of RCA. This hope was realized in August 1985 when the Government of the People's Republic formally acceded to the Agreement. It therefore gives me special pleasure, on behalf of the Agency, to welcome Mr. Fu Juxi and his delegation to this meeting.

Before reviewing RCA activities over the past year, I would like to welcome Mr. Peter Airey as RCA Coordinator, and to place on record our appreciation of the work of his predecessor, Mr. Masatoshi Kobayashi. The Agency's growing involvement in regional activities is consistent with one of the major recommendations of the "Vienna Programme of Action on Science and Technology for Development", namely that "international organizations, and especially those of the UN system, should support on a sub-regional, regional and inter-regional basis, the establishment, strengthening and development of the science and technology capabilities of developing countries".

RCA is a forerunner in the promotion of regional cooperation, and the lessons and experiences drawn from RCA over the past decade provide a basis for similar regional arrangements in Latin America and future plans for cooperation between Member States in Africa.

On 1st of April 1986, responsibility for the RCA Programme was transferred from the Department of Research and Isotopes to the Department of Technical Cooperation. The move reflects the responsibility of the RCA Coordinator to promote technical cooperation between developing countries and is in line with the advice received from Member States. I would also like to place on record our sincere appreciation to Prof. M. Zifferero for his hard work and effective guidance to RCA and the dedication of his staff.

The second extension of the Regional Cooperative Agreement will expire in June 1987. While I have no doubt that RCA activities will continue, the time seems appropriate to review the terms of the 1972 Agreement and to examine whether its provisions are still adequate. Guidance from Member States is sought in this matter.

The Agreement establishing the Asian Regional Cooperative Project on Medical and Biological Applications of Nuclear Techniques was made in Vienna on 20 February 1986 and is expected to enter into force at an early date.

All RCA activities have made good progress. One of the highlights of the past year has been the commissioning of the Ralstron radiation therapy apparatus which was donated to the Malaysian Government, through the IAEA, by the Government of Japan. The equipment has been installed in the hospital attached to the National University of Malaysia and will be used for intra-cavitary radiation therapy. It will also be used in an RCA training workshop on brachytherapy of uterus cancer later in the year.

The first phase of the UNDP Industrial Project is scheduled for completion in December 1986. The project has been particularly successful in developing the network system, i.e. the use of national institutions and capabilities to promote industrial development and to contribute to self-reliance. A proposal for Phase II has been foreshadowed. A UNDP Evaluation Review Mission was commissioned in January 1986 to assess progress and to identify future opportunities.

A draft project document has been prepared by a consultants' group for distribution to RCA Member States prior to discussion at the Tripartite Review Meeting in July and formal presentation to UNDP.

Important regional training courses in neutron diffraction and radio-immunoassay, funded through the Indian contribution to RCA, are planned for BARC commencing in June and September, respectively. The Agency wishes to express gratitude to the Indian Government for its continuing contribution.

Good progress is being made in Phase II of the Asian Regional Cooperative Programme on Food Irradiation, supported by the Government of Australia. The aim of the project is to coordinate pilot or commercial scale experiments on specific applications of food irradiation, with direct participation of the local food industry to facilitate the transfer of technology. The second meeting of the project committee was held in Hangzhou, China, 14-15 April 1985. Attention was paid not only to technical questions but also to the legislation framework for food irradiation in the Region, and to questions of the barriers to trade in these commodities.

New projects in the fields of the medical and biological applications of nuclear technology, of the applications of the Agency's computer programmes MAED and WASP to the assessment of energy requirements, and of the enhancement of the INIS capability within the Region, have been proposed for consideration by the meeting. If either of the last two are accepted, the Agency's Department of Nuclear Energy and Safety will be involved in RCA activities for the first time.

The consolidated budget for 1986 activities is close to US\$3 million. Of this amount, two thirds will be invested in the UNDP Industrial Project and one third in other RCA activities. On behalf of the Director General, I would like to express the Agency's gratitude for the extra-budgetary contributions from Australian, India and Japan, which in 1986 will amount to \$347,000 together with some carry-over resources from previous years. It is my hope that the example of India, itself a developing country, will be followed by other RCA member countries as a tangible contribution to the future of our endeavour.

To conclude, I would like to invite delegates to make full use of the next few days to renew or establish contacts with colleagues and to exchange views on the current programme. The Agency looks to the advice from this meeting to ensure that the maximum benefit is accruing to Member States from resources allocated to RCA activities.

Mr. Won Ki Kwon

Vice Minister

Ministry of Science and Technology

Mr. Noramly bin Muslim, honorable delegates from the RCA member states, distinguished guests,

It is my great honor and pleasure to inaugurate the Eighth Working Group Meeting of the Regional Cooperative Agreement of the International Atomic Energy Agency.

On behalf of the Republic of Korea, I would like to express my warm welcome to all the delegates to this beautiful flower blooming season of Korea. We feel greatly honored that IAEA has accepted our invitation to hold this very important meeting here at the Korea Cancer Center Hospital.

I fully realize that the RCA has greatly contributed to the development of Korea's nuclear programs, particularly to the promotion and utilization of RI application. Nuclear technique development is of great concern to our economic aspects in the field of peaceful uses of atomic energy.

In this regard, Korea considers it an honor to be a member of the RCA since we firmly believe that this is an important vehicle to accomplish regional cooperation through collaboration among member states for the purpose of upgrading nuclear application techniques. Korea would like to stress that we will continue to actively support its progress.

Let me turn for a moment to Korea's nuclear power programs. The uncertainty concerning the world's oil supply and the lack of energy resources in Korea make it essential for us to diversify our sources of energy, and especially to develop nuclear power. Nuclear power is becoming the all-around reliable energy source capable of meeting the soaring energy demand for economic development. Korea plans to have 33 percent of the nation's total electrical output supplied by nuclear power by 1996 with the installation of 11 nuclear power plants.

Four nuclear power plants are currently under commercial operation, with five nuclear power plants now under construction. The total current nuclear power generation capacity is 2,866 MWe. In addition to our ambitious nuclear generation program, nuclear steam supply system technology as well as nuclear fuel design and multi-purpose research reactor design technology is currently well conducted in Korea with the maximum participation of local nuclear organizations.

In parallel with the unsparing efforts in Korean nuclear power programs, Korean radio-isotope applications have been increasing gradually since their introduction to Korea in the early 1960's to keep up with the nation's industrial development over the last two decades. RI medical and industrial applications became active in the 1970's with the operation of the TRIGA Mark-III research reactor in 1972 and a large scale irradiation facility in 1975 at the Korea Advanced Energy Research Institute.

At present, approximately 45 large medical institutes use radiation facilities for medical therapy and treatment, a sizable increase compared with ten years ago when Co-60 equipment for cancer treatment was first introduced to Korea. Cancer research and treatment through the medical application of radiation and radio-isotopes are particularly active at the Korea Cancer Center Hospital.

Recognizing that the second phase of the UNDP Industrial Project has been initiated, Korea would like to confirm that regional training courses for the exchange of technical information and technical experts in the fields of NDT, tracer technology, and radiation sterilization, among others, will be the most effective method to strengthen the utilization of cooperative work in RCA activities. In this regard, Korea will maintain closer interaction with IAEA through active participation, and thereby work as a bridge between advanced and developing countries.

The Republic of Korea believes that the benefits of nuclear energy, for power and other peaceful uses, must be fully and fairly available to any country that has both the need and capability to utilize them.

Korea is participating in most of the RCA cooperative projects. We are eager to become active even in some projects with which we are not formally associated. Together with the distinguished delegates from other member states who are present here, we will explore new areas of mutual interest. It is my sincere desire that this meeting will result in an in-depth review of the current projects and that we will be able to formulate realistic recommendations for consideration at the next meeting of RCA member state representatives in Vienna.

With these words, I take great pleasure in inaugurating this Eighth RCA Working Group Meeting and wish us all success in our discussions and hope that you will carry meaningful memories of your visit to Korea.

Thank you.

Annex IV

Welcoming Remarks

Pil Soon Han
President of KAERI

There is an old Confucian saying which is as follows :

"What a delight it is to have friends from afar!"

This morning, we are most delighted to have friends from Asia and the Pacific countries who are visiting this country to generate mutual benefits in the application of nuclear techniques in the framework of the Regional Cooperative Agreement of the International Atomic Energy Agency.

Distinguished delegates,

Honorable guests,

Ladies and gentlemen,

On behalf of the host organization of the 8th RCA Working Group Meeting, it is indeed my great honor to extend a most cordial welcome to all of you on this meaningful opening of this Meeting.

I feel particularly privileged that Dr. Noramly bin Muslim, Deputy Director General for Technical Cooperation, kindly spared his time to attend this meeting and delivered the opening remarks on behalf of the Agency, and Vice Minister of Science and Technology of our Government who also kindly consented to give an inaugural address at this opening function.

Before continuing, I would like to congratulate Dr. Noramly bin Muslim on his appointment as the leader of the Agency's technical assistance and cooperation group.

We are fully convinced that this outstanding experience and competence will provide accelerated success in implementing the Agency's regular technical cooperative programs and will strongly support various on-going as well as future RCA projects.

We understand that Professor Noramly bin Muslim has made great contributions to the development of Malaysian nuclear schemes with which he has been associated for more than 10 years. In this regard, there is no doubt that we expect he will positively support the various approaches of RCA with his great enthusiasm and imagination.

The year 1986 is a very meaningful milestone in many respects for global and regional nuclear bodies. This year, we will observe the 30th anniversary of the establishment of the IAEA. We have reached one generation of the Agency's peaceful milestone for nuclear activities.

This year also marks the 15th anniversary of the formulation of this regional cooperative vehicle. Half a generation has elapsed since RCA was initiated.

On this meaningful occasion, it was our fortune to hold this 8th Working Group Meeting here in Seoul. Happily, this year, my country will host the 10th Asian Games which will demonstrate peace, friendship, cooperation and regional progress.

I would like to add that 1986 is also a very consequential year for our nuclear endeavors. This year, KAERI began several significant projects, such as viable projects as the designing of a nuclear steam supply system, the designing of commercial PWR fuels, and the designing of a multi-purpose research reactor.

In my country, nuclear power has become an absolute necessity. It can not be an alternative. We firmly believe that to be an advanced country with independent energy capability, there will be no way but to achieve self-reliance in nuclear power technology.

In this regard, KAERI is being encouraged by our Government to devote itself to develop indigenous nuclear power technologies in an effort to build-up the nation's nuclear base for the future, especially for the coming century.

Again, in this connection, I would like to stress that the most effective and timely technology transfer would be the key towards the success of these efforts.

As Chairman Munir Khan of the Pakistan Atomic Energy Commission reiterated at the Lahore Meeting last year in March, technology is the common heritage of all mankind and no country or group of countries should claim a monopoly.

Technology and experience should be shared for common benefit. Exchange of information and experiences between countries with similar situations and conditions and particularly in geographical proximity would be very desirable. Based in this context, I think we can define the meaning of nuclear techniques of the Agreement and can foresee the next phase of RCA.

The meeting place, the Korea Cancer Center Hospital, is a subsidiary body of KAERI which serves in a dual capacity as a clinic and as a place for basic researches on cancer. Ever since its inception some 20 years ago, this hospital has contributed greatly to the promotion of medical application of nuclear techniques in this country.

The hospital was originally in downtown Seoul. However, in order to meet the ever-increasing needs for cancer therapy and research, we constructed this new building some 2 years ago.

This hospital is now equipped with the latest medical equipment such as a medical cyclotron, a medical microtron and neutron therapy systems.

The hospital also maintains more than 10 research groups embracing researches on such areas as radiation hazards to the human body, preparation of labelled compounds, radio-sterilization and so on. We hope this hospital can be used as a tool for RCA in contributing to the application of nuclear techniques in human health.

In concluding, I sincerely hope your stay with us will be most enjoyable, fruitful and meaningful.

Thank you.

Annex V

A G E N D A

April 29, Tuesday

- 09:00 Registration
- 09:30 INAUGURAL SESSION
- Opening Remarks by IAEA Representative
(Deputy Director General and Head of
Department of Technical Cooperation)
 - Inaugural Address by Host Government
(Vice Minister of Science and Technology)
 - Welcoming Remarks by Host Organization
(President of Korea Advanced Energy
Research Institute)
- 10:00 Refreshment Break
- 10:30 - Election of Chairman and
 Comments by Chairman-elect
- Adoption of Agenda
 - Administrative Business by Rapporteur
- 11:00 - Summary Report of the 14th Meeting of
 Representatives of RCA Member States
- Review of the Draft Agreement of
 "Medical and Biological Applications of
 Nuclear Techniques"
 - Progress Report of UNDP Industrial Project

12:30 Luncheon hosted by Chairman of 8th WGM

14:00 TECHNICAL SESSION

- Use of Induced Mutation for Grain Legume Production
- Regional Project for Food Irradiation
- Domestic Buffalos Production
- Biological Tissue Grafts
- Maintenance of Nuclear Instruments
- Basic Science Using Research Reactors
- Nuclear Techniques for Toxic Elements in Foodstuffs

19:00 Reception and Dinner hosted by
Vice Minister of Science and Technology
and Cultural Programs

April 30, Wednesday

09:30 Future Direction of RCA

- New Proposals

Review of the Operation of Regional
Cooperative Agreement

11:30 Special Lecture
(Dr. Chang Kun Lee,
Nuclear Training Center of KAERI)

- 12:30 Luncheon
- 14:30 UNDP Industrial Project (Phase II)
- 15:00 Country Statements
- 16:00 TECHNICAL SESSION (Continued)
- Hydrology and Sedimentology
 - Semi-dwarf Mutants for Rice Improvement
 - Tropical Parasitic Diseases
 - Imaging Procedures for the Diagnosis of Liver and Thyroid Diseases

May 1, Thursday

- 08:30 Field Trip
- Tour of the Korean Folk Village
- 14:00 Visit to KAERI and Tour of the Facilities
- 15:00 Bus Tour of Daeduk Science and Town and Return to Seoul
- 18:00 Arrival at Seoul and Informal

May 2, Firday

09:30

RCA Action Plan for 1986 and
Cost Projection for 1987

Presentation and Acceptance of Report and
Other Business

11:00

CLOSING SESSION

- Closing Remarks by IAEA and
Complementary Remarks by Chairman

ADJOURNMENT

ANNEX VI

RAS/79/061 - THE UNDP/IAEA REGIONAL PROJECT ON THE INDUSTRIAL APPLICATIONS OF ISOTOPES AND RADIATION TECHNOLOGY FOR ASIA AND THE PACIFIC

Introduction

1. The project went into force on 1 April 1982 and now enters its last year of operation. This report briefly covers activities carried out during 1985 and outlines the activities planned for 1986.

Project Activities, 1985

a] Management and Coordination

2. The third Tripartite Review Meeting was held in Jakarta on 30 April 1985. The meeting discussed project activities for 1984 and the project plan for 1985, both of which were subsequently approved. The meeting also considered the draft Terms of Reference for the UNDP Project Evaluation Mission and made appropriate recommendations.

3. Three sub-project networks of National Coordinators were established during 1985. The National Coordinators for Non-Destructive Testing had their first meeting in September 1985 in Bombay while that for Radiation Processing met in December 1985 in Takasaki, Japan. The National Coordinators for Tracer Technology is scheduled to meet during 1986.

4. Separate Expert Advisory Groups (EAG) were established for three of the sub-projects under Radiation Processing; radiation vulcanization of rubber, radiation curing of surface coatings and radiation cross-linking of wire and cable insulations. The EAG each had one meeting during 1985 and made specific recommendations regarding the respective sub-project activities. The existing EAG for NDT met twice during 1985.

b] Training Courses and Consultant Missions

5. Seven regional training courses were carried out during 1985, attended by 74 participants. They were from Bangladesh (4), Peoples' Republic of China (11), India (12), Indonesia (8), Republic of Korea (4), Malaysia (8), Pakistan (5), Philippines (3), Singapore (1), Sri Lanka (6) and Thailand (12).

6. Mr. R. Gilmour (Australia) visited China in June/July 1985 to assess the status of NDT and examine the modalities for Chinese participation in the project. Prof. A. Niemi (Finland) visited Thailand during December 1985 to assess the status of tracer applications in Thailand and identify target industries where the potentials tracer application exist. Further missions are planned for 1986.

Project Plan, 1986

7. Nine regional training courses are planned in 1986, including two that are new i.e. A Train-The-Teacher in NDT to be held in Shanghai in September and on Radiation Sterilization of Human Tissues to be held in Colombo in November. The fifth training course on the Use of Nucleonic Control System in the Paper Industry, the last in the series, has been successfully carried out during February - March 1986.

8. Four National Executive Management Seminars on Tracer Applications and three on Radiation Sterilization of Medical Products have been carried out during January - February 1986. Further seminars are planned during 1986, subject to interest shown by participating countries to organize such events.

9. A research and development programme aimed at improving the properties radiation vulcanized latex will be carried out during 1986. Three scientists, one each from Malaysia, Sri Lanka and Thailand will spend seven months in Takasaki Radiation Chemistry Establishment, Japan followed by two months at the regional facility in Jakarta to carry out the programme.

10. In the effort to consolidate the output from the project, specific consultant missions are planned during 1986 to follow-up on previous project activities. The consultants will meet trainees and managers who have been involved with the project in the past, to analyze project output and achievements and to identify possible reasons for lack of actual investments by industry in cases where this has not actually occurred. The consultants will make appropriate recommendations to the Agency.

11. The UNDP Project Evaluation Mission completed their task during January - February 1986. Their report included recommendations for project extension beyond 1986. These recommendations will be reviewed during the Consultant Group meeting which will draft out a Project Plan for Phase II, to be considered by the national counterparts during the next Tripartite Review Meeting scheduled for July 1986 in Bangkok.

Prepared by :
Ahmad Tajuddin Ali
Project Coordinator
RAS/79/061.

WORK PLAN
UNDP REGIONAL INDUSTRIAL PROJECT
1986

March 1986

JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
1.1 Sub-Project 1 Tracer EMS Malaysia, Indonesia, Rep. Korea, Bangladesh 20 January-2 February	2.2 Sub-Project 1 Senior Consultants' Mission, Thailand, Mal. Sri Lanka, Bangladesh Indonesia, Pakistan, China, Philippines, Republic of Korea Dec. 85 - Feb. 86	3.1 Sub-Project 3a 2nd Expert Advisory Group Meeting on Wood Products, Jakarta 10-14 March	4.1 Sub-Project 2 National Co-ordinators Meeting, Philippines 31 March - 3 April	5.1 Sub-Project 2 RLA Workshop, Milan 19-23 May	6.1 Sub-Project 1 National Co-ordinators Meeting Sri Lanka 16-19 June
1.2 Dipping Equipment for RVNRL, Jakarta		3.2 Consultants Meeting for Preparation of new Project Document for II Phase Project Vienna, 24-27 March	4.2 8th RCA Working Group Meeting Seoul, 29 April - 2 May	5.2 Sub-Project 3a Fellowships (R&D) RVNRL Japan, Indonesia 24m/m starting 12 May	6.2 Sub-Project 5 Nucl. Instrumentation Engineering Tr. Course Tokyo, 16 June-4 July
1.3 Procurement of UV curing lamps (Wood Products) Jakarta	2.3 Sub-Project 4a Training Course for Paper, BanPong, Tokyo 17 February-7 March				
1.4 Sub-Project 4c Continuation of Minerals Training Course, Australia, Philippines 14 January-14 March	2.4 Sub-Project 3b Radiation Sterilizat. EMS, Sri Lanka, Bangkok Korea, 3-10 February				
1.5 UNDP Evaluation Mission, Vienna and in the Region 15 January-7 February	2.5 Sub-Project 3b Expert Advisory Group Medical Products Seoul, 12 February				

	PC Travel	PC Travel		PC Travel	PC Travel
1.1 Requirement: Issuance of (6) Special Service Agreem. RAS/B/049 Cost: US\$15,000	2.2 Requirement: Issuance of (3) Special Service Agreem. RAS/B/008 Cost: US\$12,000	3.1 Requirement: Issuance of (3) Special Service Agreem. RAS/B/008 Cost: US\$15,000	4.1 Requirement: Issuance of (11) Special Service Agreem. Japan Contribution Cost: US\$24,000	5.1 Requirement: Issuance of (1) Special Service Agreement RAS/B/008 Cost: US\$8,000	6.1 Requirement: Issuance of (12) Special Service Agreements RAS/B/008 Cost: US\$15,000
1.2 Requirement: RAS/B/008 Cost: US\$23,000	2.3 Requirement: Issuance of (15) Training Agreements Japan Contr. \$12,000 Cost: RAS/B/050 \$38,000	3.2 Requirement: Issuance of (6) Special Service Agreem. RAS/B/008 Cost: US\$35,000	4.2 Requirement: No requirement under Project	5.2 Requirement: 3 Fellowship Agreem. RAS/B/008 US\$35,000 Japanese Contrib. Cost: US\$15,000	6.2 Requirement: Issuance of (12) Training Agreements Japan Contribution RAS/B/047 US\$50,000
1.3 Requirement: RAS/B/008 Cost: US\$3,000	2.4/2.5 Requirement: Issuance of (4) Special Service Agreem. RAS/B/051 Cost: US\$ 28,000				
1.4 Requirement: Course financed under Australian Contrib.					
1.5 Requirement: Issuance of Special Service Agreem. RAS/B/008 Cost: US\$50,000					

WORK PLAN
UNDP REGIONAL INDUSTRIAL PROJECT
1986

March 1986

JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
7.1 4th Tripartite Review Meeting Bangkok 14-17 July		9.1 Sub-Project 2 MDT Training Course (Level II), Tokyo 8 September-3 October	10.1 Sub-Project 3a Training Course on Wood Products Jakarta, 29 Sept.-17 Oct.	11.1 Sub-Project 3a EMS Wire and Cable India, Korea 17-21 November	12.1 Sub-Project 3a EMS Curing Applic. Thailand, Malaysia 8-12 December
		9.2 Sub-Project 3a 2nd Expert Advisory Group Meeting on RYNRL Takasaki 1-3 September	10.2 Sub-Project 2 Reg. Training Course on MDT, Shanghai 29 Sept. - 11 Oct.	11.2 Sub-Project 1 Training Course on Tracer, Bombay 10-29 November	
		9.3 Sub-Project 3b National Seminar Rad. Sterilization, China Malaysia, 10-17 Sept.		11.3 Sub-Project 3a 2nd National Co-ord. Mtg Radiation Processing Malaysia, 10-15 Nov.	
		9.4 Sub-Project 3b Training Course on Radiation Sterilization of Medical Products India, 8-26 September		11.4 Sub-Project 3b Training Course on Human Tissue Steril. Sri Lanka 17-28 Nov.	
		9.5 Sub-Project 3a Training Course on Wire and Cable Shanghai, 8-26 September			

	PC Travel		PC Travel	PC Travel
7.1 Requirement: Issuance of (14) Special Service Agreements RAS/B/008 Cost: US\$20,000	9.1 Requirement: Issuance of (12) Training Agreements Cost: RAS/B/054 \$38,000 Japan Contrib. \$55,000	10.1 Requirement: Issuance of (7) Training Agreements RAS/B/057 Cost: US\$38,000 Japan Contribution: US\$13,000 Equipment: US\$5,000	11.1 Requirement: Issuance of Special Service Agreements RAS/B/056 Cost: US\$15,000	12.1 Requirement: Issuance of Special Serv. Agreements RAS/B/060 Cost: US\$25,000
	9.2 Requirement: Issuance of Special Service Agreements RAS/B/008 Cost: US\$15,000	10.2 Requirement: Issuance of Training Agreements RAS/B/052 Cost: US\$35,000	11.2 Requirement: Issuance of (12) Training Agreements RAS/B/045 Cost: US\$38,000 Equipment: US\$24,000	
	9.3 Requirement: Issuance of (4) Special Service Agreements RAS/B/053 Cost: US\$25,000		11.3 Requirement: Issuance of Special Service Agreements Japan Contribution Cost: US\$22,500	
	9.4 Requirement: Issuance of (12) Training agreements RAS/B/043 Cost: US\$38,000		11.4 Requirement: Issuance of Training Agreements RAS/B/058 Cost: US\$42,000	
	9.5 Requirement: Issuance of Training Agreements RAS/B/055 Cost: US\$45,000			

Activities not yet scheduled:

Sub-Project 2 NDT

Expert Missions in support of National Training Courses and Seminars,
Philippines, Indonesia, Thailand, China, 10 m/weeks
RAS/8/008, Cost: US\$15,000.

Sub-Project 3a Radiation Processing

Expert Missions R&D for RVNRL, Indonesia, 4m/m, (Mr. Makuuchi)
Japan Contribution, Cost: US\$36,000

Expert Missions on Wood Products, Indonesia, 3m/m, (Mr. Sasaki)
Japan Contribution, Cost: US\$26,000

Expert Missions - Training of local staff for maintenance and servicing
of radiation facilities, (gamma facilities) Indonesia, 1m/m (Mr. Nakamura)
Japan Contribution, Cost: US\$8,000

Training in maintenance and service of EB machine, Japan 2m/m
Japanese Contribution, Cost: US\$18,000

Fellowships, 2-3 fellows, Radiation Curing Applications, 12m/m,
Indonesia, Japan, Australila
RAS/8/008, Cost: US\$18,000

Sub-Project 3b Radiation Sterilization of Medical Products

Fellowships, India, Thailand, Japan, 24m/m
RAS/8/008, Cost: US\$35,000

Sub-Project 6 Project Management

Senior Consultants (Radiation Processing, Radiation Sterilization, Paper,
Steel, Minerals)
RAS/8/008, Cost: US\$58,000

Official Travel, RAS/8/008, US\$27,000

Mission Costs, RAS/8/008, US\$5,000

Miscellaneous, RAS/8/008, US\$13,000

ANNEX VII

The background paper

Regional UNDP Project for Asia and the Pacific (RCA) on Industrial Applications of Isotopes and Radiation Technology

Proposal for Phase II (1987 - 91) was distributed at the meeting. A second version incorporating responses from member states is enclosed as an associated document.

ANNEX VIII

8th RCA WORKING GROUP MEETING
SEOUL, REPUBLIC OF KOREA

EXTENSION OF THE REGIONAL COOPERATIVE AGREEMENT

PROPOSED TIMETABLE

The revised Regional Cooperative Agreement entered into force on 12 June 1982 for a period of five years. It is important that any extension be in place before 11 June 1987 to ensure continuity of administrative arrangements and of funding tied to the Agreement. The following timetable is proposed.

- 30 April 1986: 8th RCA Working Group Meeting, Seoul.
Discussion on the operation of RCA including decisions on whether to extend the Agreement; if so, for how long; and whether the proposed timetable for renegotiation is acceptable.
- 1 July 1986: Formal suggestions by Member States for changes to the Agreement to be in the hands of the Secretariat.
- 15 August 1986: Circulation to Member States of recommended changes or of options for decision by parties to the Agreement.
- September 1986: 15th Meeting of Representatives of RCA Member States, Vienna. Discussion of draft revised Agreement.
- 30 October 1986: Revised draft Agreement forwarded to Member States.
- 15 December 1986: Feedback from Member States to be notified to the Agency. Otherwise, acceptance in principle might be notified to the Agency for the sake of expediting the processing of the Agreement in its final form.
- 29 February 1987: Circulate an RCA Third Extension Agreement for acceptance by RCA Parties well ahead of expiration in June 1987.

Australia has maintained its active participation in RCA projects over the past year, and will look to the 8th Working Party meeting as a guide to where we might most effectively make an input in particular to the new project on the medical and biological applications of nuclear techniques, and to Phase II of the RCA/UNDP project. The successful completion of Phase I of this major project is a landmark for the RCA.

We note with pleasure the attendance, for the first time as a full member of the RCA, of China at the 8th Working Group Meeting. We look forward to collaboration with China in particular project activities.

In giving consideration to the future content of RCA projects, Australia considers that sight should not be lost of the original objectives for which the Agreement was established. It is obviously easier to secure the necessary financial and technical inputs required to implement projects where proposed programs have the widest possible support from among RCA members, where significant transfer of technical skills is involved, and where projects mesh closely with the development priorities of participating countries.

Australia's first major commitment to the RCA, the project on isotope hydrology and sedimentology, has now become a self-sustaining activity. More recently, Australia's largest financial contribution to the RCA has been support for the sub-project on "On-stream Analysis and Control of Mineral Concentrators", which form part of the RCA/UNDP Project on the Application of Isotopes and Radiation Technology. Over five years Australia has contributed A\$655,000 to this activity.

The aim of the sub-project has been to provide training in the use of nucleonic systems for on-stream analysis of mineral slurries and in the application of these systems to control of mineral concentrators. Australian experience has shown that this better control can lead to increased recovery of valuable minerals or increased throughput of ore through the concentrator.

All of the eleven participants from eight countries of the Asia/Pacific region attending the 1985-86 training cycle of the sub-project took part in a five week course in Australia from 15 September - 19 October 1985. This included a two weeks course at the Australian School of Nuclear Technology, Lucas Heights, on application of nuclear techniques to mineral processing; two weeks at the JKMRRC, Brisbane, on control of mineral concentrators and computer programming required for control; a two day visit to the Australian Mineral Development Laboratories (Amdel), to discuss Amdel on-stream analysis systems; and three days visiting four mineral concentrators at Broken Hill, NSW, where plant personnel described the operation of the on-stream analysis systems and use of information from these systems to improve control of the concentrators.

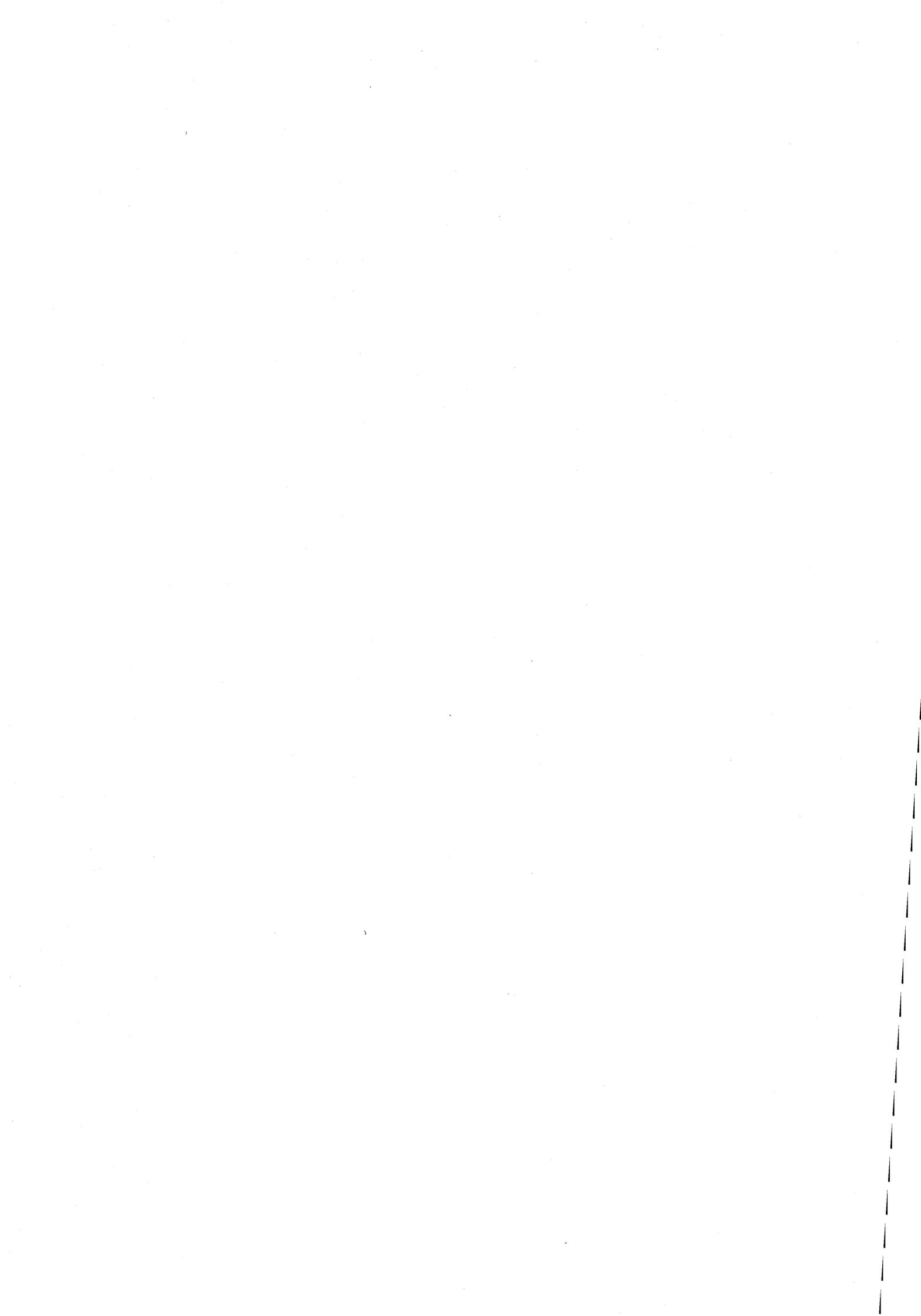
Australia will maintain its participation in Phase II of the RCA/UNDP Project. Consideration is currently being given to specific ways in which Australian expertise and equipment might be applied, and we will be using the opportunity of this meeting further to identify with other participants areas of possible mutually beneficial cooperation. These might include further applications of nuclear control systems; applications of radiation processing using electron beams and non-destructive testing.

The Australian Government is supporting Phase II of the Regional Project on Food Irradiation with a contribution of \$260,000 over three years. The RPFII Project Committee met in Hangzhou earlier this month. The Australian Government welcomes China's announcement at the meeting that it had decided to join the RPFII. It was an indication of growing Australian interest in the wider possibilities for food irradiation that four Australian experts were able to participate in the associated meetings in China.

At the 7th RCA Working Group meeting in Lahore the Australian delegation reported that the Australian Atomic Energy Commission was shortly to conduct at its headquarters in Sydney a workshop on the Commercialisation of Ionising Energy Treatment of Food. The workshop was attended by representatives from eight countries who are party to the Agreement of RPFII Phase II. The proceedings have been published and I recommend them to all delegates as an important contribution to the development of the food irradiation process on a commercial basis.

Australia expects to participate in the Project on Medical and Biological Applications of Nuclear Techniques. We welcome the initiative of Japan in developing this new project framework, and are considering the scope and content of an Australian contribution to it. We see some scope for the provision of training in Australia in nuclear medical techniques: we already cooperate bilaterally with both Indonesia and Malaysia in this field. Australia is considering the possibilities for a sub-project on the use of computer techniques in technetium imaging, which has broad applications in the cardiological, neurological and oncological areas. We would wish to identify possible interest on the part of RCA member states in a sub-project along these lines. Australian scientists are continuing their involvement in several other RCA projects such as Buffalo production, technetium generators, parasitic diseases, toxic elements in foodstuffs and tissue graft sterilisation.

Finally, in examining the need for revision of the RCA Agreement (INFCIRC/167), Australia considers that close consideration should be given to the management structure for RCA activities. The aim should be for improved communication flows, clearly defined management responsibilities, and timely evaluation of programs. We would hope that the 8th Working Group meeting could identify shortcomings in the existing text, so that the proposed timetable set out for the circulation of a Third Extension Agreement can be met. It follows from this that Australia clearly believes a further extension of the RCA is warranted, and that we expect to continue to lend support to cooperative projects within this framework in the years ahead.



ANNEX X

EIGHTH RCA WORKING GROUP MEETING COUNTRY STATEMENT - BANGLADESH

International Atomic Energy Agency (IAEA) has executed Regional Co-operative Agreement (RCA) programme in fourteen countries in Asia and Pacific region to promote and co-ordinate Research, Development and Training Projects in nuclear fields through collaborative efforts among relevant national institutions in the region. IAEA's role has been to provide organizational, administrative, advisory, technical and financial assistance when needed to secure successful execution of the projects. Fourteen projects are presently being implemented under the umbrella of RCA.

Bangladesh has participated in all the fourteen projects under RCA Programme.

Some of these projects like mutation breeding for grain legumes have already disseminated sufficient information for the benefit of individual Member States and, therefore, will be declared complete at the end of 1986. There are a few projects like Food Preservation, which have reached a stage from where commercialization is possible and, therefore, have been extended to Phase II in order to provide required information for commercialization through the technology already obtained. There are some projects which have disseminated valuable information enabling Member States to use them. One of them Health Related Environmental Research has given rise to another project (initiated from 1986) of vital importance Nuclear Techniques for Toxic Elements in Food Stuffs. There are a number of other projects which have been producing valuable information in the field of Biology, Health, Industry and Agriculture and these are being continued. In order to make best use of such research findings and to establish and co-ordinate co-operative research for the promotion of medical and biological applications of nuclear techniques, and training for the transfer of developed techniques, IAEA and Member States have lately reached an agreement establishing the Asian Regional Co-operative Project on Medical and Biological Application of

Nuclear Techniques. Such an agreement at this stage only indicates the importance attached various sub-projects under this field of study and benefits of their applications that we are expecting to achieve.

In the field of industrial application of radiation and radioisotopes, IAEA initiated a project under the name IAEA/RCA/UNDP Project on Industrial Application of Isotopes and Radiation. BAEC has participated in all the 5 sub-projects under this UNDP Project. These projects started in 1982 for a period of 5 years with the main objective to train personnel so that industrial applications of various techniques could be taken up by Member States successfully. Bangladesh has made major break through in non-destructive testing (sub-project 2), medical sterilization (sub-project radiation processing 3b) and in nucleonic control system for paper industry (sub-project nucleonic control system 4a).

In NDT, we are planning to start level-I courses before the end of the year. NDT Personnel Certification Committee and Academic Committee have been formed with the approval of the Government. BAEC is providing NDT Services to about 22 industrial organization/ establishments. As regards radiation sterilization of medical products, the process has already become popular and there is a great demand for this service. Steps for commercialization are progressing fast.

In the recently held Executive Management Seminar on "Tracer Technology" it was recognized that tracer technology was ideally suited for fast diagnosis of faults in operating industrial systems where high economic benefits in terms of savings in shut down period could be earned. The application of this technology in Bangladesh should relate inter alia to raw materials, production process efficiency, machinery, quality of finished products and the environment. Various industrial managements have taken keen interest in the application of this technology in selected problems. An Evaluation and Needs Assessment Mission for Industrial Applications of Isotopes and Radiation Technology visited Bangladesh during January 1986. During

review meetings with the said Mission, the Bangladesh Atomic Energy Commission observed that some of the projects had given good results and therefore, should get continued support, and others having potentialities must not be overlooked and should be taken up for application in Bangladesh context.

As regards Agency's WASP computer methodology programme Bangladesh is interested to participate in this programme because of its worldwide acceptance as a planning tool for use in medium and long-term electrical generation expansion planning studies and to provide useful indications about the economic optimal share of nuclear power.

EIGHTH RCA WORKING GROUP MEETING SEOUL, REPUBLIC OF KOREA
29 APRIL - 3 MAY, 1986

PROGRESS REPORT

I. UNDP/IAEA REGIONAL PROJECT ON THE INDUSTRIAL APPLICATIONS OF ISOTOPES AND RADIATION TECHNOLOGY FOR ASIA AND THE PACIFIC (RAS/79/061).

Bangladesh is participating in all ten areas of five sub-projects of the Regional Industrial Project. An account of our participation in the management and co-ordination, training programme and research and development work is given below:-

a. Management and co-ordination

Bangladesh National Counterpart attended the 3rd Tripartite Review Meeting held in Jakarta on 30 April, 1985.

For better co-ordination IAEA established three national co-ordinators for three sub-projects namely, Tracer Technology, Non-Destructive Testing and Radiation Processing. Bangladesh appointed all three national co-ordinators. National Co-ordinator for NDT attended the 1st and 2nd meeting held in September, 1985 and March/April, 1986 in Bombay and Manila respectively. First meeting of National Co-ordinators for Radiation Processing held in Tokyo, Japan could not be attended by Bangladesh National Co-ordinator. National Co-ordinator for Tracer Technology is likely to attend the first meeting to be held in Sri-Lanka, 16 - 19 June, 1986.

b. Training

In all 9 participants from Bangladesh attended the 10 training courses organized from January 1985 to April 1986. Sub-Project wise attendance is listed below for ready reference:

Name of the Project/ Sub-Project.	Date of course	Person attended nominated.	Remarks.
1. Tracer Technology	-	-	-
2. NDT	9 Sept.- Oct. 1985	Mr. Md.Enayet Ullah Mollah.	
3. Radiation Processing	30 Sept.-	Mr.Md.Moshin Ali	Govt. appro- val not obtained
(a)Radiation Vulca- nization of Natural Rubber Latex.	25 Oct., 1985		
(b)Radiation Curing of Wood Surface Coating	4 Nov.-6 Dec. 1985	Mr.Md.Ataur Rahman BFIDC.	Participated
(c)Radiation Cross Linking.	14 Oct.-2 Nov. 1985	Drs.F.R.Al-Siddique, & K.M. Iddris Ali.	-do-
(d)Radiation Steri- lization of Medical Products.	24 Sept.-26 Oct. 1985	M/S. A.K. Siddiqui & Harun-or-Rashid	-do-
4. Nucleonic Control Systems	25 Feb.-15 March, 1985	Mr.Md.Jahangir Kabir, BCIC.	IAEA regretted.
(a)Paper	17 Feb.-7 Mar. 1986.	Mr.M. Emdad Hussain	Participated
(b)Steel	3-25 Oct. 1985	Dr. Taslimuddin Ahmed.	Govt. approval not obtained.
(c)Mineral	16 Sept.-19 Oct. 1985 and 20 Jan.-17 Febr. 1986.	Dr. Dewan M.M. Hadi	Participated
5. Nuclear Instrumen- tation Maintenance.			
(a)Nucleonic Instru- mentation Eng.	25 Nov.-13 Dec. 1985	M/S. Mahmudul Hasan & K.C. Goon.	Postponed by IAEA.

c. Research and Development

1.1. INDUSTRIAL TRACER TECHNOLOGY

In order to introduce the concept of industrial tracer technology (ITT) in Bangladesh and to explore the possibilities for its application, the First National Executive Management Seminar on ITT was organized in Dhaka during 31 January - 2 February, 1986. There were about 20 participants from different industries and the Bangladesh Atomic Energy Commission (BAEC). The seminar was followed by a visit to different industries in Bangladesh by Dr. J.F. Easey, Senior IAEA consultant for the project and Senior Executive Personnel from the BAEC, during February 17 -20, 1986.

The possible areas of application of ITT in Bangladesh have been identified and a modest programme for support by the IAEA has been submitted by the project consultant (JFE). On the part of the BAEC, so far, a Senior Experimental Officer took part in the first Training - Demonstration course held in India and Singapore during March, 1984.

1.2. NON-DESTRUCTIVE TESTING (NDT)

Bangladesh has been actively participating in the Non-Destructive Testing (NDT) sub-project under UNDP/IAEA/RCA programmes on the Industrial Applications of Isotopes and Radiation Technology since 1982.

Due to a great degree of awareness for quality control and assurance, the NDT techniques are being applied in most of the industries in Bangladesh and its applications are growing faster.

Besides Bangladesh Atomic Energy Commission (BAEC), which is pioneer in the application of NDT technology in Bangladesh, many industrial organizations like Titas Gas Transmission and Distribution Co., Ltd., Fertilizer Factories, Drydock and Heavy Steel Structure Works, Bangladesh Airlines etc. and some private companies have been developing NDT facilities in their own capacity with the active assistance of BAEC.

NDT facility in BAEC.

BAEC is pioneer in Bangladesh for development and implementation of NDT technology for quality control and assurances in the industrial sector of Bangladesh. The NDT programme of BAEC has the following objectives:

1.2.1. RESEARCH & DEVELOPMENT WORK ON DIFFERENT NDT TECHNIQUES.

Development of radiographic techniques using different radiation qualities (x-rays and neutron) have been taken up in BAEC. This work involves the study of the film characteristics, effect of radiation quality on the quality of radiographs etc. BAEC has also plan to take R & D programmes on other NDT techniques as and when other NDT facilities will be available.

1.2.2. NDT SERVICES.

BAEC has been rendering excellent NDT services to the industries of various natures in public as well as private sectors such as Eastern Refinery Ltd. Chittagong, 110 MW Ghorasal Power Station, Urea Fertilizer Factory, Ghorasal, Drydock and Heavy Steel Structure Works, Chittagong, 210 MW Thermal Power Station, Ghorasal, Palash, Norsinghdi, etc.

1.2.3. NDT TRAINING IN BANGLADESH.

BAEC is the only organization in Bangladesh where NDT training is offered.

To build up a strong and effective infrastructure of local NDT practitioners of level I and level II (operator and technician level respectively) of international standard, NDT training programme has been taken up by BAEC in co-operation with UNDP/IAEA/RCA projects on "Plan for Regional NDT Training and Certification". Comments of Bangladesh on the proposed plan have already been communicated to IAEA. It may be noted that Bangladesh is ready to harmonise with Regional NDT Training and Certification scheme.

A few NDT training courses have already been offered by the BAEC to the local NDT practitioners. These are all basic NDT techniques and no particular level or standard was followed.

For implementation of the NDT Training and Certification Programme in Bangladesh in harmonization with the Regional (RCA) NDT Training and Certification, a National Certifying Body in the name of "NDT Personnel Certification Committee" has been formed.

BAEC has planned to hold an NDT Training Course at level-I this year for local NDT practitioners.

1.3. RADIATION PROCESSING

1.3.(a). Radiation Vulcanization of Natural Rubber Latex.

We are at present in the preliminary stage of this project. A group of scientists from Institute of Nuclear Science and Technology (INST) is expected to participate in the natural rubber vulcanization project at Pasar Jamat (CAIR), Indonesia through RCA.

1.3.(b) Radiation Curing of Wood Surface Coating

i. Wood-plastic composite (WPC)

Modification of various kinds of wood through graft co-polymerisation of a few monomers by radiation chemical treatment was carried out. Some improvement of dimensional stability was observed in the wood plastic graft co-polymer.

ii. Fibre-board plastic composite

In order to make high resistant and durable insulating board it has been decided to incorporate partex and hard-board with various polymer through radiation chemical means. The effect of dose rate on the amount of (poly) methyl methacrylate incorporation into hard-board and partex has been determined experimentally.

iii. Jute plastic graft co-polymerization

Jute-plastic composites (JPC) were prepared with both jute fibres and its yarns with various types of monomers. The effect of monomer concentration, total dose, swelling agents (like ethanol, methanol) on the polymer uptake has been studied. Both styrene and acrylonitrile was found to impart resistance on jute towards micro-organism. The affinity of JPC towards moisture has been found to decrease with increasing polymer loading onto jute.

1.3.(c) Radiation Cross-Linking of Insulating Materials for Wires and Cables.

Preparation for an R&D Project in the field of Radiation curing/cross-linking of insulator wrapping on wires and cables has commenced after two scientists returned from a 3 weeks' training course in this field, held in Shanghai, China, last October 1985. At present it is difficult to estimate the annual production of wires and cables as a large number of small industries produces insulated cables in the capacity of small-scale domestic industries, along with the large-scale production of these products by their larger counterpart. The Eastern Cables Ltd. is the prime cable manufacturer in Bangladesh. It is estimated that the country produces cables and wires worth US\$10m.

1.3.(d) Radiation Sterilization of Disposable Medical Products.

The Institute of Food and Radiation Biology (IFRB) of BAEC has conducted a feasibility study on the Radiation Sterilization of Medical Products in Bangladesh and found it feasible.

IFRB has adequate laboratory facilities and trained manpower for carrying out microbiological and radiation dosimetry work relevant to this field.

As the medical products are composed of different materials and of

varying density and often composed of more than one component a detailed dosimetric evaluation of each group of products has been made in order to determine the point of minimum dose in the production box.

IFRB has also conducted a survey on the (a) microbiological contamination in medical products (b) radiosensitivity of various microbes (c) sterilization dose requirement for medical products (d) monitoring the effectiveness and success of radiation sterilization process etc. The medical products used for this study were as follows: Vasectomy Kits, Blood donor set, Catheter, Plastic Petridish, Maternity Kit, Eye Ointments, Antibiotics, etc.

It has also extended radiation sterilization services to local manufacturers and users of medical products and pharmaceuticals.

1.4. NUCLEONIC CONTROL SYSTEM (N.C.S.)

1.4.1. Paper Industry.

For Bangladesh the application of N.C.S. has envisaged to be effective in four different phases, e.g. Phase-I: Increasing the awareness about N.C.S. and building up of manpower; Phase-II: Feasibility study for introduction of N.C.S., Phase-III acquisition of N.C.S. from abroad, installation commissioning, test run service needs etc. Phase-IV: Development, fabrication, adaptation and assembling of N.C.S. instrumentation.

Some progress has been made in this direction. Phase I: Successful effort has been made in developing awareness through radio talk, publication popular articles in national dailies and correspondence with factory managers, planners and executives.

As regards building up of manpower not much progress has been made, apart from offering training to some managers/technical personnel through IAEA.

Phase II: Feasibility studies:- During the visit and discussion with the mill management it appears that most of the causes of low production is attributable to poor quality pulp for which an abnormal number of paper break occurs; however there are sufficient reasons to believe that some 20% of those paper break are attributable to non-homogeneity of the caliber and non-conformity to the required moisture content.

NCS can take care of these aspects, another aspect is the grade change time particularly for the Karnaphuly Paper Mill while the data have been collected and the computer runs are now being performed to assess the cost/benefit ratio of the proposed N.C.S. in the Khulna Newsprint Mill and Karnaphuly Paper Mill. However the preliminary calculations taking into account the paper break, grade change time, energy saving, raw material saving and increase in machine speed through the introduction of N.C.S. would afford enough cost saving to pay for the capital cost of the N.C.S.

The preliminary result of the above mentioned feasibility study being very encouraging, enquiries have already been sent to several manufactures for supplying the latest information about the current N.C.S. available with those manufactures, their literatures and the prices. It is expected that a fuller comprehensive study about the current status, feasibility and the recommendation regarding the introduction of N.C.S. would be presented to the authorities in the form of a report covering the public sector paper industry.

1.4.2. Mineral Beneficiation.

Under this programme, a Senior Scientist participated in the Second Training - Demonstration Course held in Australia during Sept. - Oct. 1985 and in the Philippines during Jan. - March 1986. The basic objective of this course was to train scientists in nucleonic control system, instrumental methods of mineral analysis and computation which can be introduced in mineral processing industries for on-stream analysis and quality control.

II. THE USE OF INDUCED MUTATIONS FOR IMPROVEMENT OF GRAIN LEGUME PRODUCTION.

In its final stage the CRP was extended for two years in the form of non-funded research agreements. The purpose of this extension was to give the breeders an opportunity to evaluate their mutant material genetically and agronomically and report about the results at the final research co-ordination meeting scheduled for this year.

Out of 10 target plants Bangladesh concentrated on Mungbean, Blackgram and Chickpea. During last year agronomic performance of the mutations generation mutants of these three plants were evaluated. High yielding and disease resistant varieties were identified.

In addition studies on Mutation Induction in Mungbean, Blackgram and Chickpea using chemical mutagens were done MZ plant progeny rows were grown for studying their breeding behaviour to select true breeding useful mutant lines for further study.

III. REUTILIZATION OF AGRICULTURAL AND AGRO-INDUSTRIAL RESIDUES THROUGH NUCLEAR TECHNOLOGY.

The project has been recently undertaken with objective (i) to assess potentiality of locally produced agricultural and agro-industrial resources as raw materials for conversion to fuel, feed and other valuable products. (ii) to search for potential cellulolytic micro-organisms in these strains employing nuclear and other conventional techniques. (iii) to develop good enzyme system for obtaining fermentable sugars from residues and good microbial system for conversion to alcohol chemicals etc. (iv) to develop an economic pretreatment method for bioconversion of cellulosic residues employing gamma radiation in combination with other methods.

The progress made during last year is summarised as follows:
(a). Twenty out of fifty cellulose decomposing aerobic and mesophilic bacteria isolated were found to be potential in cellulolytic properties.

Five strains showed good growth on all the substrates thus five potential cellulolytic strains were selected for quantitation assessment of growth in liquid culture and degradation of semisynthetic cellulosic substrates.

(b). A large number of fungal isolates from different sources were screened for growth and cellulose production in solid media containing overlay of powdered cellulosic substrates.

(c). Some progress has been made in the pretreatment experiments with sugarcane bagasse. Ball milling, steaming, gamma irradiation and combination of alkali treatment with irradiation were compared in releasing reducing sugar. Maximum release was observed with combination of alkali and irradiation. The work is being continued.

IV. STERILIZATION OF TISSUE GRAFTS

Under the auspices of International Atomic Energy Agency, BAEC is trying to develop a Tissue Bank with an aim of radiation sterilization and preservation of various human and animal tissues like skin, bone cartilages, embryonic and tympanic membranes etc. needed for human surgery. In this connection a project proposal was sent to IAEA. One scientist has already received her training in Philippines and another scientist will receive training shortly. Project leader is likely to attend the course arranged by IAEA in Sri Lanka November 1986. Recently, a research contract on tissue banking has been offered by IAEA and work has already been started on the project. Amniotic membranes were collected from different clinics and hospitals and their microbial loads (contaminations) were determined. Radiation sensitivity of the isolated microbes (bacteria) will be studied soon.

V. NUCLEAR TECHNIQUES IN FOODSTUFFS AND DRINKING WATER.

In this programme the representative food items selected for Bangladesh are Rice, Wheat, Potato, Fish, Egg, Milk and Vegetables. The main elements of interest are As, Cd, Cr, Cu, Pb, Hg, Se and Zn, Analytical procedures based on particle-induced X-ray emission (PIXE),

XRF and AAS are to be developed for quantification of these toxic and essential elements. An external beam PIXE method has been developed to analyze Cr, Cu, Zn, Se, As and Pb in foodstuffs. AAS methods are being developed for Cd, Pb and Hg. A PIXE method has been reported for multielement water residue analysis after preconcentration by evaporation on cellulose matrix. A preliminary investigation of heavy elements in some marine fishes from the Bay of Bengal has been completed and no toxic level of the elements was observed. Representative sample collection for cereals, fish and vegetables and their preparation for subsequent analysis is now in progress. The method of NAA would be applied when the research reactor becomes operational in this year.

VI. ISOTOPE APPLICATION IN HYDROLOGY AND SEDIMENTOLOGY

International Atomic Energy Agency has approved the project "Studies on sand and Silt Movement in Chittagong Harbour by Radioactive Tracer Techniques" BGD/8/004 and sanctioned a sum of US \$93,200 for equipment and expert services. The project work would jointly be carried out in collaboration with the Chittagong Port Authority (CPA).

Some bed-load samples were collected and analyses were made but those samples were not enough, so a detailed hydrographic map for bed-sample collection was prepared. Depth and the water level of the harbour are being measured by the CPA. Other related site-works would be carried out as soon as the equipment are at hand and then the tracer experiment would be finalised.

BAEC has sent a research contract proposal "Studies on the Groundwater Resources in Bangladesh using Isotope Tracer Techniques" to the IAEA for its support. In this context, it may be mentioned that the BAEC has completed some laboratory experiments on groundwater resources using radioactive tracer techniques under IAEA research contract No.2107/RB.

By constructing the model tank and performing model experiments under the above research project an expertise was gained for future use

of the method in the field. With the procurement of the required field equipment we shall plan and carry out some studies in different parts of the country in collaboration with the Bangladesh Water Development Board and Bangladesh Agricultural Development Corporation.

VII. MAINTENANCE OF NUCLEAR INSTRUMENTS IN BANGLADESH

The objective of this program is to provide good power conditioning and environmental conditioning to different laboratories and Institutes of the BAEC. Accordingly, dedicated earth lines were installed and laboratories were supplied with air cooling machines. At the Atomic Energy Centre, Dhaka a 150 KVA capacitor bank was installed to improve the power factor from 0.3 to 0.9. IAEA was very generous in supplying 20 constant voltage transformers and line conditioners. IAEA also supplied as with sufficient number of surge suppressors and relays, with the help of which we were able to construct 37 manual type and 3 automatic type of drop out relays. These were later distributed to different laboratories of BAEC with particular attention onto the Institute of Nuclear Medicine and other Nuclear Medicine Centres.

Last year we received an IBM-PC, Model No-5151 as a grant from IAEA. This was given to us to implement the Computerized Management for Preventive Maintenance with the help of the dBase III software. Since we were not familiar with the dBase III, it took sometime for us to develop its understanding. But with the arrival of Mr. A.M. Patanker, an IAEA staff member, at the end of 1985, the programme got its initial thrust. During his one month stay, we became familiar with the dBase II and with his support were able to create 66 files out of which 5 were data base files. Just the other day we received the last version of this program from IAEA with 85 files of which 9 are data base files. This particular programme is being developed by IAEA in collaboration with all RCA member countries. The programme is yet to be developed further and awaiting implementation.

This IAEA/RCA Research Project is currently running for the fifth consecutive year.

VIII. FOOD PRESERVATION

VIII.1. Inter-Country Transportation Studies

Inter-country transportation studies have been undertaken in collaboration with Indonesia Atomic Energy Agency. About 40 kg dried fish has already been air-lifted to Indonesia. Total 40 kg dried fish, packaged in 5-ply carton boxes with an inner lining of polyethylene was used. Parameters proposed to be studied:-

1. Condition of the packaging materials: appearance, damage, insect penetration, etc.
2. Moisture content.
3. Total bacterial count.
4. Total mould count.
5. Total volatile base.
6. TMA.
7. Peroxide value.
8. Free fatty acid.
9. Physical appearance and organoleptic evaluation (9-point hedonic scale).

Observations on the above parameters will be studied both in the BAEC, and the Indonesian counterpart laboratories. The study will be continued after every two months for a storage period of six months.

VIII.2. Pilot-Scale Irradiation of Bangladesh Onions.

The project has further been approved under Asian Regional Project on Food Irradiation Phase II (1985-87). Twenty tons of onions have been procured to study the storage of irradiated onions in forced ventilated ambient condition. A modified storage system has been designed which

incorporated forced airflow devices for harnessing and blowing natural air all around the storage racks. The system is being installed in a low cost warehouse which is expected to be developed as a "Model Storage" for demonstration to growers and commercial people. Irradiated onions will be marketed at the end of the season (August-December) and consumers acceptability will also be evaluated. At the end of the experiment cost-economics of the irradiation processing and storage will be done.

IX. IMAGING PROCEDURE FOR DIAGNOSIS OF LIVER DISEASES

During the period of the report imaging of phantom, evaluation of images sent by RCA co-ordinating group have been done. Patients have been selected at random for imaging of Liver of Patient suffering from liver disease. 100 such images will be taken.

X. NUCLEAR TECHNIQUES FOR THE DETECTION OF PARASITE ANTIGENS IN HOST BODY FLUIDS IN PATIENTS SUFFERING FROM MALARIA AND FILARIASIS.

During the period under report the laboratory facilities have partially been set up for the project. IAEA has procured and supplied a number of reagents and small items of equipment to supplement our efforts.

The samples of body fluids were collected from the patients suffering from malaria and filariasis. These samples were sent to participating laboratories in Bombay, Geneva and Lille. We could not study the samples in our laboratory as the techniques for assay could not be established.

ANNEX XI

COUNTRY STATUS REPORT

the People's Republic of China

8th RCA Working Group Meeting in Seoul

29 April-2 May, 1986

China joined RCA in August 1985, and this is the first time for Chinese Delegation to participate officially in the RCA Working Group Meeting. I believe the meeting will be success in the cooperative spirit developed over the years among the member states of RCA.

In China, the application of radioisotope and radiation technique in industry, agriculture and medicine has made a significant progress in recent years. I would like here to summerize the current status of our activities in some of the RCA projects.

1. Tracer Application

In China, the Radioisotope tracer technology is now applied in petroleum, metallurgical, mechanical, chemical and electronic industries, hydrology and water conservancy etc. In petroleum industry, the application of tracer technology consists mainly of the measurement of water intake profile in water injection well, the determination of the distribution of a corrosion retardant agent in natural gas pipeline, the location of leaks in underground oil pipeline and the 'diagnosis' for tertiary recovery. Some successful results have been achieved.

Last January, an expert mission of IAEA on Isotope Tracer Technology visited China, and we hope that more cooperation achievement on Isotope Tracer Application between countries in Asian and Pacific region will be gained.

2. Non-Destructive Testing

At present, in China, Conventional NDT techniques-radio-graphic, ultrasonic, magnetic-particle, liquid-penetrat, eddy-current and visual testing are widely used in aircraft, aerospace, nuclear, auto, shop building, chemical, petroleum, mining, metallurgical and light industries, especially in power plant, railway, electrical power transmission, production of nonferrous and composite materials, and boiler pressure vessel safety supervision. Now about 50,000 persons are involved in NDT practice in China. The Chinese Institution for NDT is responsible for the training, qualification and certification of NDT personnels. In order to promote harmonization of NDT personnel qualification and certification among nations, a regional teach-the-teachers course on NDT will be organized in Shanghai, October this year. We would like to strengthen international cooperation in NDT fields.

3. Radiation Processing

In China, about 25 institutes and universities have engaged in the project of applied research in industrial radiation processing.

About 10 radiation service centres for industrial and commercial use have been established or are under construction. Some results have been achieved in following fields : radiation crosslinking of wire and cable insulation, heat shrinkable film, tubing and tapes, electron beam curing of surface coating, radiation polymerization of acrylic amide, radiation graft polymerization to prepare permselective membranes, radiation foamed plastic, radiation crosslinked silicon rubber tubing, radiation sterilization of medical supply, and food irradiation preservation.

During 14 Oct.-2 Nov. 1985, the first training-demonstration course on radiation crosslinking applications in wire and cable industry was hosted by Shanghai University of Science and Technology, in which twelve trainees from RCA Member States participated. The first course was quite successful. And the Agency has decided that the second one will be held in Shanghai, 8-26 September, this year.

As to the radiation sterilization of medical products, we will organize a National Executive Management Seminar on Radiation Sterilization of Medical Products in Beijing Radiation Center, in September.

4. Food Irradiation

Food irradiation research started in China as early as 1958. Now preservation of more than 35 individual foods by irradiation have been investigated.

The safety evaluation expert commission of irradiated foods was established. Seven irradiated food items for domestic marketing trial, including potato, onion, garlic, peanut, rice, mushroom and sausage have been approved, and recently, irradiated apple was also approved. In order to dispel misgivings of consumers for irradiated foods and solve some toxicological trials problems, after animal feeding trials, we have conducted human eating trials with 35 individual irradiated foods which are more than 60% of the diet. It is concluded that eating irradiated foods is safe for the human body.

In April, the IAEA sponsored three activities on food irradiation preservation in China, those were:

The FAO/IAEA Seminar for Asia and the Pacific on the Practical Application of Food Irradiation, cosponsored by Shanghai Science and Technology Commission, Shanghai Institute of Nuclear Research, Shanghai, 7-11 April.

The Second Meeting of the Project Committee of the Asian Regional Cooperative Project on Food Irradiation (RPFI Phase II) cosponsored by Institute for Application of Atomic Energy, Zhejiang Academy of Agriculture Sciences, Hangzhou, 14-15 April.

Study Tour on Food Irradiation Development to Shanghai, Hangzhou, Beijing, Chengdu, Guangzhou, 12-25 April.

In Shanghai Seminar, more than sixty delegates from the worldwide and more than one hundred Chinese delegates participated, and seventy papers and reports were invited and contributed. We believe that through the Communication, the clearance of food irradiation process, the technology transfer to local industry, market testing and consumer acceptance, and the international trade of irradiated foods would be promoted.

On 1986 Food Irradiation Seminar in Shanghai, Chinese delegate expressed that China will be a new party of the Asian Regional Cooperative Project on Food Irradiation (RPFII Phase II). And I have the honour to inform you that we are willing to contribute the Shanghai Irradiation Center as a regional training-demonstration center for food irradiation in Asia and Pacific. We hope more cooperation between China and other countries of the Region on food irradiation research and development will be conducted.

5. Nuclear Medicine

In order to promote the cooperative researches in medical and biological applications of nuclear techniques, we are in favor of the Agreement establishing the Asian Regional Cooperative Project on Medical and Biological Applications of Nuclear Technique.

In China, we have done some work on cancer therapy by the combination of treatment by conventional radiation and physical or chemical means, on nuclear techniques for the diagnosis of malaria, schistosomiasis and other tropical parasitic diseases, on quantitative evaluation of nuclear medicine imaging procedures for the diagnosis of liver diseases.

In 1987, China will co-sponsored a training course on Radioisotope production using reactor and accelerator, including some medical radioisotopes and the development of ^{99m}Tc generator.

6. Nuclear Agricultural Sciences

Nuclear techniques are extensively applied in agricultural research and making considerable contributions to the modernization of agriculture in China. In those fields such as radiation mutation breeding, control of harmful insects by radiation sterilization, radiation preservation of food, isotope tracer studies on plant nutrition and application of fertilizers, biological nitrogenfixation, irrigation and soil improvement, effects of pesticides and residues, animal physiology and diagnoses of animal diseases, remarkable achievements have been made.

We have done some works on the use of induced mutation for grain legume production, on domestic buffalo production, on the use of nuclear-based analytical methods for determining the levels of toxic elements in staple foodstuffs commonly consumed by Chinese population, and one semi-dwarf mutants for rice improvement, we will be happy to cooperate with member states of RCA in these fields.

From 15 Sept.-26 Oct. 1986, the FAO/IAEA regional training course on plant breeding by using radiation induced mutation will be held in Zhejiang Agriculture University, Hangzhou.

I have the honour to inform you again that China would like to host the 10th RCA Working Group Meeting in 1988.

Mr. Chairman, During this meeting, some new meaningful Project proposals were suggested. China will make a serious study and response positively to them. It is a matter of great pleasure that all the participants agreed in principle the extension of the Regional Cooperative Agreement. We are looking forward to the bright future of further fruitful cooperation in the region.

Mr. Chiarman,

I appreciate the arrangement you have made for the meeting. My colleague and I would like to join other delegates to congratulate the success of this important meeting, and to thank the host for their contribution to it.

Thank you, Mr. Chairman.

8th RCA Working Group Meeting

ANNEX XII

Seoul, April 29 - May 3, 1986

COUNTRY STATEMENT - INDIA

India is very happy to participate in the 8th Working Group Meeting of the RCA member states which is being held in Korea, a country which has made significant advances in the field of nuclear energy in recent years. As you are aware, India has been actively associated with the RCA programme since its inception as it strongly believes that RCA provides excellent opportunities for mutual co-operation amongst the countries of the region in the field of nuclear science and technology. Besides participating in various RCA Projects, India has also on-going collaborative programmes in the field of nuclear science with many of the countries of this region. This meeting, therefore, provides us an opportunity to renew contacts and exchange ideas in areas of mutual interest with the scientists of this region and in particular with those of the host country with whom we have long ties.

Most developing countries which are desirous of using atomic energy for electricity generation, face the choice between acquiring atomic power stations on a completely turn-key basis from advanced countries on one hand and developing relevant technology indigenously with the long range objective of achieving self-reliance. India has chosen the second path in view of its special circumstances

viz the large size of the country and the large scale of its requirement spreading over a long time span. The only viable alternative, therefore, was to progressively adopt full indigenisation of the programme. This strategy has also served as a springboard for inducting modern technology in many other areas. We have also made conscious efforts to make the results of research and development work in nuclear science and technology available to other technologies so as to accelerate the pace of technological development in the country. These efforts have paid rich dividends, as the results of development work in many areas of atomic energy have already been successfully utilised in other sophisticated technologies.

The last year has been particularly satisfying in the field of nuclear energy in India. In August 1985 the high flux Dhruva reactor at Trombay became operational. This reactor, which is of totally indigenous design and construction, provides a powerful tool for research in frontier areas of nuclear science and technology. Dhruva has experimental facilities for research in reactor engineering and neutron physics besides facilities for producing high specific activity radioisotopes. 1985 also witnessed the commissioning of the second unit of Madras Atomic Power Station (235 MWe), which has a very high degree ^{of} indigenous content. The successful attainment of the criticality of the Fast Breeder Test

Reactor (FBTR) at Kalpakkam saw the culmination of the scientific and technical efforts that have gone into its making for over a decade. FBTR is a sodium cooled, plutonium fuelled loop type fast reactor designed to produce 40 MW of thermal power and 13 MW of electrical power. The reactor has been made operational with all important components, including the Pu-U carbide fuel, made within the country. The successful operation of this reactor will provide the necessary experience and confidence for building larger prototype fast breeder reactor of 500 MWe capacity. These achievements in the field of nuclear energy have prompted us to take major steps in the rapid expansion of the nuclear power programme in the country, which now envisages setting up of an installed capacity of 10,000 MWe by the turn of the century.

We would like to emphasize the importance of man-power training while pursuing a sizable nuclear power programme. The operational experience gained with our research reactors like Apsara and Cirus has stood us in good stead while undertaking a large nuclear power programme in the country, which has necessarily a long gestation period. We would be happy to share our experiences with other RCA member states in areas of reactor physics, NDT for evaluation of reactor components, fuel testing, safety aspects of nuclear power stations, including pre-operational environmental surveys, to name a few. India has recently conducted an IAEA Inter-regional Training Course on Preparation of Nuclear Data for

use in Reactor Calculations which has been found to be very useful by the participants attending the course.

With the change in the complexion of the programmes undertaken for the development of atomic energy in various member states, the activities under RCA also need to be suitably augmented. It is in this context India has suggested in the past the extension of RCA project to regional collaborations in research and development for nuclear power, including mineral prospecting, power planning, operation and maintenance of power plants and related health and safety aspects. We understand that an expert committee of IAEA will assess the situation in the region in this regard.

In the Regional Industrial Project on Radioisotope Applications, India has been playing a leading role commencing from the formulation of the project proposals to its execution in different areas. Because of the considerable experience and its wide base in the industrial applications of radioisotopes and radiation technology, India has been assigned a major role in sub-projects relating to radiation sterilization of medical projects and tracer technology in industry. During 1986, India will conduct training courses in the field of radiation sterilization of medical products and tracer technology in industry. The fact that the duration of both of these courses has been increased by one week

and more practical demonstrations have been added, points out to the high utility of the courses to the participants, particularly from the industrial sector. Further India has made available the services of its experts for the NDT sub-project for evolving the qualification and certification procedures, designing a syllabus for Level III Courses and for the preparation of training manuals. Similarly India provided lecturers for Advanced NDT Courses held at Tokyo and Singapore. While the Regional Industrial Project is now poised to enter into its second phase, we would like to emphasize that the regional nature of the project should be maintained and that all of the sub-project activities including the sub-project on NDT should continue to form part of the overall industrial project in its second phase under the RCA. Further wherever possible, the experts should be found from the region. While in some cases it may be necessary to bring in experts from advanced countries, it should be ensured that the full responsibility for project management remains within the region.

Under the RCA Programme, India will conduct a summer course on reactor neutron beams in the study of materials during June-July 1986. On the basis of response received so far, it is expected that the course will be attended by at least 8 participants from RCA member states and about 20 local participants.

India has always attached considerable importance to the application of nuclear techniques in the area of public health and has supported R & D activities for the development of radioimmunoassay techniques for various diseases prevalent in the developing countries. Although RIA procedures are of great value as diagnostic aids in detection of various diseases, their application is still limited because of lack of trained manpower. A course on RIA Techniques and its Clinical Applications will be organised in India during 1986 for medical and para-medical personnel from RCA member states. India's special contribution to the RCA programme will be utilised for running these two courses. The holding of these courses is consistent with India's policy of sharing its facilities and experience with other RCA member states for applying nuclear techniques in areas which have potential for practical applications.

India is also keenly interested in the development of improved Tc-99m generators using Mo-99 produced in low power research reactors and has contributed significantly to the RCA programme in this field. India is also deeply interested in RCA programmes in the areas of diagnostic imaging techniques and radiation therapy of cancers.

The use of atomic energy for improvement in agriculture is another area on which India has consistently laid great stress. India supports programmes for the development of

improved crop varieties by radiation induced mutations. Considerable success has already been achieved in India in developing improved varieties of groundnuts, rice and jute, some of which are being cultivated on large scale in different parts of the country.

In the field of radiation processing, we are happy to record that in India there is a continued sustained growth in the use of radiation technology for sterilization of a wide range of locally produced medical products and devices. We expect that a chain of medium sized radiation plants will be set up around the country in the next 5 years thus serving the needs of industries located in different parts of the country. The project for the radiation treatment of sewage sludge, undertaken at a medium sized city in India, is at an advanced stage and this pilot plant is expected to be commissioned by early 1987. With the clearance of certain irradiated foods issued by the Government recently, we now look forward to the early establishment of radiation plants for treating various food products in the country.

We propose that the Indian contribution for 1987 be utilised for organising seminar/workshop in India on the subject of Maintenance & Operation of Research Reactors, covering areas of reactor physics, control instrumentation and safety aspects. A second workshop could be organised in the field of isotope applications in medicine e.g. Technetium-

99m Generators and Kits which have very crucial role to play in the practice of nuclear medicine in developing countries. Alternatively, a workshop could be organised on Aerosol Inhalation Imaging for Diagnosis of Respiratory Diseases, using techniques developed and practiced in India.

India has been privileged to be one of the founder members of the Regional Co-operation Agreement, and has taken active interest in its various activities over the past 14 years. It has also made special contribution of \$ 50,000 to the RCA programme. We believe that the success of various programmes under RCA has largely been due to the truly co-operative effort which all the participating member states have put in for mutual benefit. The programmes identified under RCA have underlined the similarity of goals pursued by the member states and the problems faced by them in achieving these goals.

In conclusion, we wish to state that RCA has proved to be extremely useful in fostering strong links of regional co-operation in areas such as building up of infra-structure for supporting nuclear energy programmes and applications of nuclear techniques in industry, medicine and agriculture. India strongly supports the renewal of the Regional Co-operative Agreement in its present framework for a further period of five years. We also urge that the proposal for renewal of the agreement in its final form be brought up for approval

at the meeting of the representatives of RCA member states
scheduled to be held in Vienna during September 1986.

Indonesia

It is a great pleasure for me to be able to participate in the 8th RCA Working Group Meeting here in Seoul.

We understand that the objectives of the RCA is to promote regional cooperation among member states of IAEA in areas of common interest. The cooperation among countries in the region is expected to yield greater benefits and ensures regional self sufficiency and self reliance. It is therefore essential that pooling of skills and know how and coordination of efforts should be endeavored among the members, so as to make efficient use of their resources. It is heartening to note that such goals are being pursued by the IAEA in creating a framework for promoting regional cooperative projects such as this RCA.

We are fully aware to the benefits gained from the RCA and we have participated in most of the projects. At present participations of Indonesia are in the following projects:

- UNDP regional project on industry
- Use of induced mutations for improvement of grain legume production
- Food irradiation
- Nuclear technique to improve domestic buffalo production
- Sterilization of biological tissue grafts
- Maintenance of nuclear instruments
- Isotopes applications in hydrology and sedimentology
- Semi - dwarf mutants for rice improvements
- Nuclear techniques for tropical parasitic diseases
- Development of Tc-99m generator system.

A new research proposal on Nuclear techniques for toxic element is just in the process to be forwarded to IAEA for consideration.

Concerning the UNDP project on Industry, Indonesia will always support this project. As we understand that the goal of this project is transfer of technology to lay the foundation for long term economic benefits in the region by:

- increasing use of modern technology in industries
- improving the competitiveness for manufactured products in world markets, through better quality, higher productivity and lower cost
- effecting efficiency in industrial processing.

It is therefore Indonesia will support and encourage the extension of this project and will be very pleased to offer again the place for project office.

In the area of food irradiation, from the technological points of view we are prepared to transfer this technology to be applied in industrial scale, however the legal aspects still under consideration by Department of Health.

Research coordination meeting on the use of nuclear techniques to improve domestic buffalo production was just taken place in Bogor Indonesia last January. Since the productivity of this animal is not a factor of nutrition only, so spreading of research through an integrated multidisciplinary approach to study the interrelationship between nutrition, reproduction, diseases and managerial practices is a very good step in promoting improvement of production. From the Indonesian government's point of view, the topic of this project is quite relevant to the basic policy of food production improvement since this animal has been playing an important role in the rural economy due to its actual and potential value as a meat, milk, and drought animal. Further development of research programme in the country on this field is being anticipated through the inclusion of animal nutrition component into UNDP Country programme, project No. INS/78/074.

Research on "Groundwater study in Jakarta and vicinity" finished last year, and final report has been submitted to Agency.

Through the RCA project on Isotope application in hydrology and sedimentology, and through technical assistance from the Agency and from the government input, analytical facilities have been established in Centre for the Application of Isotopes and Radiation - BATAN. These facilities include benzene synthesiser, unit of electrolysis system, liquid scintillation, mass spectrometer, atomic absorption spectrometer and UV-spectrometer. Using these set of instruments will enable to measure C-14, C-13, tritium, deuterium, O-18 and chemical assay for water analyses. In June/July this year an IAEA/UNESCO regional seminar on application of isotopes in hydrology will be held in Jakarta.

Indonesia has joined the RCA since the initial stage of the establishment of RCA. As mentioned before that from the participation in RCA, much benefits have been obtained through coordinated research programme, regional training course and seminar. Through this way, it enable scientist from member states are getting together to discuss common topic of interest with the the spirit of cooperation among others. The other thing where RCA is very beneficial to the member states is if topics of the project are in accordance to the current programme in the country. This will emphasize or even lead to increase and better achievement of the target, because fund, facilities and other forces can be assembled together. From these points of view Indonesia, again will always support and take part in RCA activities.

ANNEX XIV

Country Statement

Japan
April 1986

1. Created in 1972, the Regional Cooperative Agreement (RCA) has now 14 years of history, during which it has achieved tangible and remarkable progress in the field of peaceful uses of nuclear energy. The Japanese Government, recognizing the importance of international cooperation in the peaceful uses of nuclear energy, bearing in mind that overseas development cooperation not only in the field of nuclear energy but also in other fields in general can be viewed as a moral obligation and a valuable tool in contributing to global peace and prosperity, has become a full member of RCA in 1978. Since its participation in RCA, the Japanese Government has played an active role in various cooperative activities within RCA forum, and has made significant contributions in the form of financial cooperation and in kind cooperation as well. Past contribution made by the Japanese Government could be interpreted as a

presentation of its firm and clear position with aims at enhancing activities of RCA.

2. Principles of Japan's Economic Cooperation are based on "humanitarian concerns" and "the recognition of interdependence between North and South. Bearing this in mind, we put particular emphasis on the aspect of "human resources development" when extending our cooperation. We have repeatedly expressed our position during the past occasions such as RCA General Conference and RCA Working Group Meeting. As in the past, we will make our future cooperation with consideration on "human resources development".

3. Japanese RCA cooperation now comprises two fields, namely RCA/UNDP Industrial Project, and Medical and Biological Application Project. As for the RCA/UNDP Industrial Project Japan participates in four sub-projects, Radiation Processing, Non Destructive Test, Nucleonic Control System, and Maintenance. We will continue to make as much effort as possible to support RCA/UNDP Industrial Project. Medical and Biological Application Project is concerned, our support will be focused

particularly on the field of Nuclear Medicine and Cancer Therapy.

4. Japanese financial contribution to RCA projects during 1980-1985 period totals more than 1.4 million U.S. dollars. We have always made our maximum effort to make as much financial contribution as possible despite serious budgetary difficulties in the Government's general expenditure for the last several years. We will make our contribution for this year of 424,500 U.S. dollars, which is the highest level of amount since Japan began its financial contribution to RCA projects. In addition, certain contributions in kind will be considered on case-by-case basis. We hope that the Japanese contribution be used in effective and efficient manner for further enhancement of RCA activities, and also hope that IAEA make its efforts for better coordination and arrangement in implementing RCA projects.

5. Taking this opportunity, we would like to raise the question of reviewing the text of RCA. We have already pointed out this at the last year's RCA Working Group Meeting held in Pakistan. As you

all are aware that we are requested to have a specific agreement on each project according to Section 5 of Article 2 of RCA. But looking into the present situation of project implementing procedures, we cannot but recognize the fact that we are not in conformity with the stipulation of RCA only except a few cases.

One such case, for example, is the Agreement establishing the Asian Regional Co-operative Project on Medical and Biological Application of Nuclear Techniques, recently circulated by the Agency for formal acceptance by member states. We welcome such movement which completely corresponds to the stipulation of RCA, and the Japanese Government has already notified the Agency of its formal acceptance. We hope other member states accept the Agreement as soon as possible so that Medical and Biological projects will be further enhanced.

Present RCA expires in June next year. It is our understanding that all member states desire to continue cooperation on peaceful uses of nuclear energy as we have had during the last 14 years. In

that case, we have two options, first is to extend the present RCA without any modification, and second is to have a revised RCA which accomodates actual implementing procedures of various RCA projects. It is apparent that the second case would be better.

The Japanese Government, therefore, would like to invite all member states to RCA to initiate necessary actions so that we can have a better agreement replacing present one which expires in June next year. In this connection, we are very pleased to announce that as one of the active roles we play within the framework of RCA, we will present a working paper to be discussed, studied by all parties concerned.

ANNEX XV

EIGHTH RCA WORKING GROUP MEETING, SEOUL,
29 APRIL - 2 MAY 1986

Country Statement : Malaysia

1. Malaysia has been associated with the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for the Asia and Pacific Region (RCA) from its inception. We have participated in almost all of its activities including the project on the industrial applications of isotope and radiation. We are also involved in a number of research contracts with the IAEA and have participated in a number of training courses, training demonstrations, workshops and seminars organised under the project. As such we have benefited from these activities, either through the training and exposure of our young scientists or as a forum for the exchange of information and ideas amongst scientists in the region. RCA has achieved some of its objectives in promoting technical cooperation among countries in the region through the use of the available resources and expertise for the peaceful uses of nuclear energy.
2. The present RCA agreement was initially concluded in 1972 for a period of 5 years and was further extended twice for another 10 years until 1987. My country believes that the RCA activities have contributed tremendously to the present development of nuclear science and technology in the region. It has resulted in a greater collaboration and interaction amongst the scientists either directly through RCA or indirectly through bilateral cooperation amongst member states. We would therefore request the RCA agreement be extended a further 5 years from 1987. We also hope that the RCA activities will be expanded to cover a broader area of interests to the member states in the region.

3. We are very pleased with the implementation of the regional industrial project on the applications of isotope and radiation under phase I which will end in Dec. 1986. A further 5 years extension of the project will be appreciated by my country. We hope the UNDP Evaluation Mission that had visited a number of selected countries early this year would have had gathered useful informations for their evaluation on the implementation of the various sub-projects as well as the potential of the projects in the future. Malaysia, is keen to participate in the phase II of the project especially in the sub-projects NDT, radiation processing and tracer technology.
4. Malaysia hosted the IAEA's Executive Management Seminar (EMS) on tracer technology in January 1986, which was attended by more than 60 participants from the Government and industries. The National Coordinators from Thailand, Pakistan and China were also present. It was concluded that this technology has a lot of potential in the petroleum, cement, paper and steel industries in Malaysia. This project is being implemented in Malaysia with the assistance of IAEA and through a bilateral cooperation with Australia.
5. Up to now Malaysia has sent a total of 12 personnels to the various NDT training courses under the sub-project NDT organised by the IAEA. Most of them are still involved in NDT activities either in the government or with the private sector. A National Seminar on the 'status and prospect of NDT in Malaysian Industries' was held in Kuala Lumpur on 15-16 October 1985. Malaysia has already established a certification scheme for the NDT personnel. Under the certification scheme, 5 training courses on NDT in the field of radiography and ultrasonic at level I and II will be held this year. The training course will be conducted by the Nuclear Energy Unit and the Standard Industrial Research Institute of Malaysia in collaboration with the Atomic Energy Licensing Board and the National Industrial Training and Trade Certification Board (NITTCB). A National Committee on NDT will also be established this year. A train-the-trainers course on dye penetrant and magnetic particles is being planned for 1987.

6. Malaysia participated in the sub-project radiation processing in the training demonstration on surface coating of wood and crosslinking of wire and cable. This year, a research scientist from the Rubber Research Institute of Malaysia was selected for a 9 months R & D fellowship in RVNRL in Japan and Indonesia. This programme also caters for scientists from Thailand and Sri Lanka. We hope the R & D programme will be successful and will result in cheaper RVNRL process with superior quality products.
7. In the area of surface coating of wood and wood product, not much activity is carried out in the country at the moment due to the non-availability of EBM or UV machine. However, the potential of curing application by surface coating is tremendous. We will emphasise on the curing of low quality wood such as rubber wood and other lesser known species of wood. We believe the problem associated with the transfer of this technology to the industry is not only due to the non-availability of the EBM but is also due to the high cost of the process. In this regard, we would like to suggest that R & D programme be carried out especially on monomer formulation and process condition. This is necessary since the cost of monomer and liquid nitrogen is generally expensive in the region.
8. We will host the IAEA's EMS on medical products sterilization in September 1986. We hope it will generate more interest in the subject especially among the manufacturers and users of medical products. The policy of our government is to use more indigenous raw materials like rubber and plastic in the manufacturing industries such as in medical products. We thus propose that R & D programme on the selection of material suitable for sterilization process be initiated under this project.

9. Under our fifth Malaysia Plan (1986 - 1990), a semi-pilot multipurpose radiation processing facility will be installed at the Nuclear Energy Unit. The facility will consist of a Cobalt-60 facility and EBM facility. We hope activities such as medical products sterilization, food irradiation and surface coating of wood can then be feasible.
10. For the project on the 'medical and biological applications of nuclear technique', our government is already participating and will enter into agreement with the IAEA very soon.
11. Malaysia has received a high dose rate 'Brachytherapy' Unit called RALSTRON B20 and X-ray screening Unit from the Government of Japan and IAEA respectively in February 1986 under the project on the improvement of cancer therapy. The Units have been installed at the Institute of Radiotherapy, Oncology and Nuclear Medicine, General Hospital Kuala Lumpur under the supervision of Japanese experts. We would like to thank the Government of Japan and the IAEA for donating this equipment and the service of the experts. The equipment will be used in a regional training course on 'Brachytherapy of the Uterus Cancer Using Manual and Remote after loading technique' which will be held in Kuala Lumpur on 6-26 October 1986. The objective of the course is to provide intensive training to radiotherapist and medical physicists not adequately familiar with modern techniques, including safety consideration, in radiation therapy of carcinoma of the cervix. The official announcement on the course has been distributed by the IAEA.
12. A project for the development of Tc-99m generator system started in 1985. The method chosen made use of an inactive preparation of the sample, followed by irradiation and loading the radioactive material onto a glass column. In this way the time of handling of radioactive material is minimised. The results obtained so far are encouraging and the eluates are of a standard comparable to Tc-99m produced by other methods. However, studies performed so far involved only low activity radioisotope.

13. The project on Isotope Hydrology and Sedimentology started in 1980 involving three institutions. Studies on the environmental isotope hydrology undertaken in the Kelantan Basin and the Kedah/Perlis area are now completed, whereas the projects undertaken in Sg. Muar Basin and Langkawi are in progress. This project will be expanded to cover some other areas in Malaysia. Although this RCA project will end in 1986, technical assistance from the IAEA in the form of ^{18}O and ^2H analysis is still needed as our own facilities will only be established in 1987. A national/regional seminar on water resources - isotope application is being planned for 1987. Assistance from the IAEA especially in the form of lecturers for this seminar will be appreciated. We would like to propose that a review meeting for the national project coordinators be held before the end of the project.

A carbon-14 rig capable for quaternary water dating as well as for archeological dating was donated to Malaysia by the Australian Government. We would like to record our thank to the Australian Government for the donation. A tritium enrichment facility which was also donated by Australia for the project is in good operating conditions.
14. Malaysia is participating in the project on 'irradiation on black and white pepper' under the RPFII phase II project. A pilot study of the feasibility of gamma irradiation treatment was carried out by the Nuclear Energy Unit and the University of Agriculture in collaboration with the Pepper Marketing Board Sarawak. Two seminars on food irradiation technology were held in Malaysia last year. A National Codex Alimentarius Commission has been established this year. Under our food regulation act 1985, the commercial use of irradiation and marketing of treated agricultural and food products is still prohibited unless prior approval is obtained from the Director General of Health. Since most of the commodities are mainly for export purposes, we feel that problems related to international trade should be solved as soon as possible to ensure commercialisation of this technology.

15. We are of the opinion RCA still has a bigger role to play for mutual cooperation among the countries of the region in the field of nuclear science and technology. We are happy to learn that the whole coordination of the RCA matters in the IAEA is now under the Department of Technical Cooperation. We would like to suggest to the IAEA that for a better coordination of the project at the national level, the IAEA should try to have a proper work plan for all RCA projects similar to the work plan on the Industrial Project.

ANNEX XVI

8TH WORKING GROUP MEETING OF RCA MEMBER STATES

COUNTRY STATEMENT-PAKISTAN

The Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) is an established and valuable instrument between International Atomic Energy Agency (IAEA) and Member States in South East Asia and the Pacific.

Pakistan is actively participating in the RCA projects and at present is involved in 11 out of 14 RCA projects list in Annexures-I and II.

The progress of different projects is detailed below:

1. UNDP Project

Industrial Application of Isotope and Radiation Technology

During the current year, Pakistan has participated in the following sub-projects of the UNDP Project:

i) Industrial Tracer Applications

The National Coordinator for the sub-project has been appointed and has attended the meeting of the Coordinators of the sub-project on Industrial Tracer Application held at Kuala Lumpur, Malaysia from 20-21 January, 1986.

ii) Non-Destructive Testing (NDT)

Pakistan has been actively engaged in the utilization of NDT techniques in various industries in the country. For the last several years, many NDT courses of Level-II have been held in which more than 300 technical personnel from all over the country participated and were awarded certificates. During 1986 Pakistan has offered to host Level-III course under RCA with the help of experts sponsored by the UNDP Project. In this course participants from industries and other organizations using NDT techniques will takepart. The funding of the 2-3 experts to lecture in this course will be borne by RCA. The scheme for the certification of NDT under RCA programme has been prepared

and will be submitted to RCA in due course.

iii) Radiation Processing

Representatives from Pakistan participated in the courses on Radiation crosslinking applications in wire and cable, held at Shanghai, China from 14 October to 2 November, 1985, and Radiation curing surface coating of wood products, held at Jakarta, Indonesia from 11 November to 6 December, 1985. National coordinator of this sub-project participated in the meeting held at Takasaki, Japan from 16-19 December, 1985.

With the sponsorship of RCA, Pakistan is organizing an Executive Management Seminar during 1986 on Radiation Sterilization of Medical Products. Participants from various industries from all over the country will attend this Seminar. 2-3 experts will be sponsored by RCA.

Pakistan is installing a 200,000 curies plant for sterilization of medical products at Lahore. Provision has also been made for the radiation preservation of food products to be carried out at later stage. The plant is expected to be in operation in April, 1987. Pakistan will be happy to host any demonstration course in these fields.

iv) Nucleonic Control Systems

Participants from steel industry attended a course on Nucleonic Control Systems held in India and Tokyo, Japan from 3-12 October and 7-29 October, 1985, respectively. Another participant attended a work-shop on the Use of Nucleonic Control Systems held in Thailand, and Japan from 17 February - 7 March, 1986.

AGRICULTURAL PROJECTS

Pakistan is basically an agricultural country with about 70% of its population directly or indirectly involved with agriculture. Pakistan Atomic Energy

Commission (PAEC) has, for the past several years, consistently endeavoured to use nuclear techniques for the improvement of crops and conservation of food products. PAEC has established 3 agricultural centres where nuclear and other advance techniques are used in agriculture, biology and food preservation.

2. Use of Induced Mutation for Grain Legume Production

Through induced mutations, a chickpea variety CM-72 has been evolved which is resistant against blight disease and has high yield potential. This variety now covers nearly 30% area of the total chickpea crop grown in the country. Another blight resistant mutant CM-88 is ready for release as a variety. Some wilt resistant mutants have also been induced in blight resistant lines to combine resistance against both the diseases.

3. Regional Project for Food Irradiation Phase-II

A Project on commercial trials on radiation preservation of onions is in progress. Gamma radiation dose of 100 Gy inhibited sprouting and improved the keeping qualities of Desi as well as Red varieties of onions stored under ambient conditions. The Project Investigator has participated in the Research Coordination Meeting held at Shanghai, China in April, 1986.

4. Nuclear Techniques for Toxic Elements in Food Stuffs

The Project is aimed at estimating the concentration of toxic and essential elements in foodstuffs, whether they exceed the maximum permissible levels. This project will help in suggesting integrated human diet for high, medium and low income groups.

5. Semi-Dwarf Mutants for Rice Improvement

Semi-dwarf mutants of Basmati-370 in M_2 , M_3 , and M_4 generations were selected and planted for testing the breeding behaviour. Allelism test is being performed on

promising dwarf mutants. The project investigator of this project participated in the Research Coordination Meeting during the last year.

NUCLEAR MEDICINE

The Pakistan Atomic Energy Commission is taking keen interest in the use of nuclear techniques for public health. Eight nuclear medical centres have been established with almost all major hospitals in the country. At present 4 important RCA research projects in the field of medicine are being carried out. We are keen to intensify the applications of nuclear techniques in medical sector which would benefit the suffering population in this country.

6. Biological Tissue Grafts

Under this project, it is planned to set up a tissue bank for amniotic membranes and later on for bone, skin, fascia, heart, etc. Over 100 placentae have been processed freeze-dried and radiation sterilized and the sterility tests are being carried out.

7. Improvement of Cancer Therapy

This project aims at using microwave induced hyperthermia as a sensitizer of radiation therapy in head and neck tumours.

8. Tropical Parasitic Diseases

Pakistan is participating in malaria component of the CRP on detection of parasite antigens in host body fluids. Due to the geographical differences in immunological response, the IAEA recommended during the second year of the project to incorporate local culture preparation of antigen and collection of hyperimmune serum. The work along this line has been undertaken and it is proposed to extend this project at least for the 4th year and necessary training of the scientists in AFI be provided.

9. Imaging Procedures for the Diagnosis of Liver Disease

Simulated anatomical liver phantom (SALP) received from WHO/IAEA last year was imaged on 8 Gamma Cameras in different PAEC Medical Centres, interpreted and

the images were sent to the Agency. In addition, a set of liver images of 116 patients from Japan were received and interpreted by nuclear physicians in the country. In future about 100 images will be sent by the National Institute of Radiological Sciences, Chiba, Japan, to the participating countries for interpretation by the nuclear physicians. The Principal Investigator participated in the first Research Coordination Meeting held in Tokyo from September 30-October 3, 1985.

The next Research Coordination Meeting has been proposed to be held at Lahore, Pakistan, in September, 1986.

10. Maintenance of Nuclear Instruments

Work on this project is being concentrated for computerization of the nuclear instruments for control systems. Pakistan may participate in the forthcoming meeting on this project being arranged by the RCA at Bangkok, Thailand in September, 1986.

OTHER INTERESTS

Pakistan attaches a great importance to the beneficial role that RCA is playing for the Member States. This is judged by the fact that the 7th Working Group Meeting was hosted by Pakistan at Lahore in March, 1985.

Apart from the interest of Pakistan mentioned above, following are other important interests which Pakistan would like to share with other RCA Member States:

- i) Pakistan Strongly emphasises the important role of nuclear techniques in agriculture, biology and food irradiation under RCA and reiterates its offer to share the experience at Nuclear Institute for Agriculture and Biology (NIAB) at Faisalabad with other Member States.

- ii) Pakistan is installing an irradiation plant with 200,000 curies for sterilization of medical products with provision for irradiation of food products. We will be happy to share experiences concerning on-the-job training in the area with other Member States in the region.
- iii) Pakistan is deeply interested in the use of NDT in industries and would like to host activities of RCA at NDT Centre in the country.
- iv) Pakistan has an extensive experience in the field of nuclear medicine and is running 8 nuclear medical centres throughout the country. Pakistan would welcome any sharing of this experience with Member States of RCA.
- v) Pakistan has gained experience in several other projects of RCA, including:
 - a) RIA of thyroid related hormones,
 - b) Basic science using research reactors,
 - c) Tc-99m generator systems.

NEW PROJECT PROPOSALS

1. Computer Treatment Planning in Radiotherapy

Pakistan has interest in this project since all its nuclear medical centres provide radiation therapy to the patients.

2. Intracavitary radiation therapy for cancer of the uterus

The cancer of uterus is prevalent in this country and Pakistan would like to take part in this project.

3. Development of the INIS Capability in Asia and the Pacific Region

Pakistan would like to support this project in principle.

4. Proposal for a WASP user's workshop for RCA countries

It will certainly be useful for the countries in the region to enlarge the scope of RCA to include Energy and Power Planning Areas. We feel that WASP is an extremely useful methodology for Electricity Generation Expansion Planning. The model WASP has been in use in Pakistan for several years. Pakistan is keen to support the project proposal and the inclusion of Energy and Power System Planning as an area of cooperation under RCA. It would be advantageous if the workshops on Energy Planning and Power System Expansion Planning are held in alternate years.

5. Basic sciences

Pakistan has been supporting Basic Research using Research Reactors and would continue to support this activity.

Pakistan fully supports RCA activities in the fields mentioned above. It is our sincere desire to promote collaboration through regional cooperation for peaceful uses of nuclear energy. We hope that RCA will cooperate in supporting those Member States where expertise exists but no regional centres have been established by RCA so far. This cooperation will help in bringing uniform distribution of RCA facilities in the region.

Pakistan looks forward to continued cooperation with RCA.

RCA REGIONAL COOPERATIVE PROJECTS.

1. UNDP Industrial Project.
2. Use of induced mutations for grain legume production.
3. Regional project for food irradiation Phase-II.
4. Domestic buffalo production.
5. Biological tissue grafts.
6. Maintenance of nuclear instruments.
7. Basic science using research reactors.
8. Nuclear techniques for toxic elements in foodstuffs.
9. Hydrology and sedimentology.
10. Semi-dwarf mutants for rice improvement.
11. Improvement of cancer therapy.
12. Tropical parasitic diseases.
13. Imaging procedures for the diagnosis of liver diseases.
14. Production of ^{99m}Tc generator systems.

RESEARCH CONTRACTS UNDER RCA PROGRAMME

S.No	Title	Contract No.	Principal Investigator	Amount of grant
1.	Use of induced mutations for the induction of resistance against Ascochyta blight in chickpea.	2201/SD	Mr.M.Ahsanul Haq, NIAB,Faisalabad.	\$ 1400
2.	Commercial trials on radiation preservation of onions under tropical conditions.	4216/AG	Dr.Ismail Khan, NIFA Peshawar.	\$ 4000
3.	Application of neutron activation analysis to the determination of toxic elements in Pakistani foodstuffs.	4267/RB	Dr.I.H.Qureshi, PINSTECH, Rawalpindi.	\$ 12,000
4.	Evaluation of mutant stocks for semi-dwarf type as cross breeding material in rice.	3118/RB	Mr.M.Afsar Awan, NIAB,Faisalabad.	\$ 3500
5.	Development of technology for preparation and irradiation sterilization of biological tissue grafts.	4281/RB	Dr.Munir A. Siddiqui AEMC, Jamshoro.	\$ 5000
6.	Microwave induced hyperthermia as a sensitizer of radiation therapy in head and neck tumours.	3194/RB	Dr.Munir A.Siddiqui, AEMC,Jamshoro.	\$ 5000
7.	Nuclear techniques for the detection of parasite antigens in host body fluids.	3532/RB	Dr. M.A.Shahid, AEMC,Lahore.	\$ 3000
8.	Imaging procedures for diagnosis of liver disease.	4059/JN	Dr.M.A. Shahid, INMOL,Lahore.	\$ 3000

ANNEX XVII

Sri Lanka Country Statement

First of all let me congratulate the new Deputy Director General Dr. Noramly and the new RCA Co-ordinator Dr. Airey for their appointments to these posts. I also wish to welcome the delegates of China to this RCA Working Group meeting, which is their first. Regional Co-operation under the IAEA/RCA programme in our Region has now become a well established and an important scheme, the implications of which can be considered to be going beyond mere co-operation in Science and Technology. We therefore we strongly support the RCA programme and consider that it should ultimately be established on a continuing basis. Hence we support the proposed extension of the agreement after it expires next year. The RCA has now completed 14 years and this is the 8th Work Group meeting. Next year the RCA will be 15 years old and as I had mentioned earlier the 15th Anniversary's Work Group meeting is an important land-mark and Sri Lanka wishes to host this meeting.

Regarding the projects under the RCA, Sri Lanka will be a party to the proposed agreement on "Medical and Biological Applications of Nuclear Radiation". The use of radiation for sterilization of medical products is important for my country. We have already carried out a feasibility study on this and held an EMS. A project proposal is being drawn up at present. Radiation sterilization of Human Tissue for clinical use is an important project in Sri Lanka. Due mainly to their religious and cultural background, people in my country are, in general, keen to donate parts of their bodies after their death. The infrastructure for this is already well established in Sri Lanka as for a long time we have been obtaining eyes from the corpses of those who had volunteered to donate their eyes after death. The number of eyes made available in this manner is far in excess of Sri Lanka's needs and the excess is made available to other countries free of charge. We hope to extend the scope of the eye-bank and establish the tissue-bank there. We have already held an EMS on this in Sri Lanka and a training workshop will be held in November this year.

Vulcanization of Natural Rubber Latex project is important for Sri Lanka because Sri Lanka is an important rubber producing country. We have already trained some of our people in Japan and Indonesia and we started our work with a shipment of irradiated latex sent to us from Jakarta. We have produced baby-mackintoshes, rubber-tubes, tablemats and carpet-backings using this latex. The first seminar on this subject was held in Colombo late last year and thereafter a committee representing the Rubber Research Institute, CISIR (Ceylon Institute of Scientific and Industrial Research), the IDB (Industrial Development Board) the Atomic Energy Authority and the Radio Isotope Centre was set up to implement this project. Our work will continue with a radiation source that we have received last month.

Development of Non-Destructive Testing Standards is important in Sri Lanka. For this purpose we set up a Non-Destructive Testing Society in Sri Lanka and we are thankful to Dr. Tajuddin Ali for coming to Sri Lanka for the inauguration of this society. At present we are conducting our first training course in Non-Destructive Testing with the assistance of an IAEA expert Sri Lanka will take part in the tracer project. Dr. John Easy who visited Sri Lanka helped us to identify a number of areas where tracer technology will be very useful. A meeting of the tracer project co-ordinators, sponsored by Sri Lanka, will be held in June in Colombo.

We have been taking part in the projects on the use of Induced Mutations for Grain Legume Production and Domestic Buffalo Production" we have obtained useful results from these projects. The "Maintenance of Nuclear Instruments" project has been very useful to us and at present we are conducting regular courses for technicians on electronics and instrument maintenance.

We have not taken part in the project on "Semi-Dwarf Mutants for Rice Improvement". Hydrology project is one in which Sri Lanka has been associated for a long time and at present several projects including the measurement of environmental tritium with the equipment provided by the

Australian Government are in progress. The project on the study of sediment movement has highlighted some limitations of the technique as introduced to Sri Lanka by the experts assigned for this project. We are taking part in the projects on "Tropical Parasitic Diseases" and "Imaging Procedures for the Diagnosis of Liver and Thyroid Diseases".

My delegation wishes to express our gratitude to the countries which have contributed to the RCA programme both in cash and in kind, particularly, the Governments of Australia, China, India and Japan.

Before concluding I wish to congratulate the new DDG, RCA Co-ordinator and the UNDP Project Co-ordinator for their excellent performance and thank the Government of the Republic of Korea for hosting this meeting and making our stay here comfortable. Thank you Mr. Chairman.

Thailand

Mr. Chairman, the Deputy Director General of IAEA and IAEA representative, distinguished delegates, honorable guests, ladies and gentlemen :

The delegation welcomes the opportunity of discussing the progress of the Regional Cooperative Agreement projects since the 7th RCA Working Group Meeting in Lahore, Pakistan, March 1985.

The Regional Cooperative Agreement with which Thailand has participated from its first phase has proved to be the forum for mutual cooperation among the member countries in Asia and the Pacific region in the field of nuclear science and technology. The success of the programs has been accomplished through the cooperative agreement and a friendly spirit developed over the years among all participating member states. As participating member states, we hope to go forward together to explore the useful and peaceful application of nuclear science and technology.

The RCA research programs in the medical application of nuclear technology have made rapid progress in improving the standard of health care of the people. The cooperation between IAEA and Thailand comes in the forms of research contracts including research coordination meetings, supply of equipments, expert services, workshops, seminars, trainings and/or scientific visits.

Treatment of radiation together with Chemotherapeutic drugs as a radio sensitizer is being performed in cancer therapy. In another project, the quantitative evaluation of nuclear medicine imaging procedures for the diagnosis of liver diseases is now in progress. In the project of tropical parasitic diseases, monoclonal antibody for the detection of malaria antigen has been produced at the Department of Tropical Medicine. The antibody is distributed to other participating member states within the program to compare the sensitivity of the competitive binding RIA using polyvalent antibodies and monoclonal antibodies in the detection of malarial parasites. There are current activities on the extension of the project on Radiation Sterilization of Medical Products to the sterilization of biological tissues. Bangkok Biomaterial Center has started its function in the gamma sterilization of lyophilized biological tissue grafts in October 1984. Bangkok Biomaterial Center jointly with the Office of Atomic Energy for Peace (OAEP) now preserve, gamma-sterilize, and provide the preserved biological tissues for clinical use. At the Isotope Production Division (OAEP) the project on development of TC-99m generators using low power research reactors is now being carried out. Attempt is made to search for practical solution in order to produce good quality TC-99m.

The large income of Thailand comes from agricultural products. Projects on the use of nuclear techniques to improve domestic buffalo production as well as the induced mutation in grain and legume production have added the productivity to our agricultural commodities. Furthermore, foods including mangoes, sea-foods, local fermented pork are irradiated at OAEP. The acceptance market is being observed and evaluated. Participants from Thailand have joined the RCA activities within the region. Few seminars and workshops in food irradiation have been arranged among member states in Asia and the Pacific region. In November 1985, an international seminar on food irradiation has been hosted in Bangkok with the aim to transfer the information of food irradiation technology to consumers. It was the first time when researchers, food and drug authorities, food producers, consumers and other agencies involved in the area of food irradiation technology met and discussed the problems of irradiated foods. About the same period of time, a new RCA is granted to a project entitled "Nuclear Techniques for Toxic Elements in Foodstuffs" which will accumulate relevant information on foods and drinking water for human consumption.

The R & D is only possible with the proper maintenance of nuclear instruments. A study within the framework of an RCA on "Formulation and implementation of maintenance plans for nuclear laboratories in developing countries : Thailand" has been adopted as an RCA project. A computerized maintenance planning has been started to serve the expansion of the project in the future.

The Government of Thailand is gratified of IAEA's support as well as the cooperation among Member States to the RCA/UNDP Industrial Project in providing opportunity for industrial technology transfer of nuclear techniques in the region.

Many engineers and technicians in industries have received training and demonstration workshops under the RCA/UNDP industrial project activities. The Office of Atomic Energy for Peace (OAEP), the Siam Kraft Paper Company (SKPC), and Japan Atomic Industrial Forum (JAIF), have successfully carried out five training-demonstration workshops on the use of Nucleonic Control System in paper industry during 1982-1986. The sub-project is the first one to be completely implemented and there has been 59 persons trained from all RCA countries (as of April 1986). In Thailand, estimated amount of 2 million U.S. dollars have been invested by paper companies on the system.

It has been indicated by participants that there are still need for the training -demonstration workshop in Phase II of the Project at a smaller capacity since technical information and economics of the use of NCS in small paper industry are much lacking. The Government of Thailand and a small private industry are willing to carry out such project in Phase II in the same terms and conditions as those of SKPC in Phase I.

Activities on Radiation Sterilization of Medical Products in Thailand started under research contracts both the RCA and Interregional Projects.

Through many years of research efforts, the techniques have been well established and also proved to be commercially feasible. OAEP assisted a local investor to conduct feasibility study and commissioning of the first commercial irradiation plant to sterilize medical products in Thailand. Gammatron Company Limited is the first private own gamma irradiation plant with a capacity of 150,000 curies.

A research program on preliminary investigation of properties of radiation vulcanization of natural rubber latex (RVNRL) is setting up between OAEP and the Rubber Research Institute in Haad Yai, Songkla, a province suitable for rubber plantation. A total of 1,267 tons of NRL was produced in 1984. Since NRL has very limited storage life, most rubber plantations are likely to convert NRL into either smoked sheet or block rubbers. Vulcanization of rubber by radiation has some advantageous characteristics over the vulcanization by the conventional chemical method. Therefore, the method of vulcanization of rubber using gamma irradiation is being studied. Participants from Thailand have attended some training programs arranged in the region.

The Government of Thailand strongly supports the future cooperative programs as described in the new project proposals for the third extension of the RCA for the period of 5 years after the expiration in June 1987.

Thailand has participated in the Human Health related programs mostly from their commencement. We have gained through cooperation among member states the accumulation of useful informations and have applied the nuclear technology to improve the health standard in the country. We are interested in joining the health related program "Medical and Biological Applications of Nuclear Techniques" and are seeking cooperation within the scope of our appropriate regulations and finance.

The progress of RCA projects is not possible without sincere spirit to cooperate among all member states. The potential extension of the cooperative agreement has shown that the cooperation among member states has developed through the years of hard work and efforts.

We are thankful to the Government of the Republic of Korea which has arranged this meeting and made our stay most pleasant. Sincere appreciation also extends to the International Atomic Energy Agency and member state friends, particularly to the Governments of the donating countries, Australia, Japan, and India.

We hope that this cooperative agreement will move us all member states to go forward together and to actively apply peaceful uses of nuclear technology in the region.

Thank you.

ANNEX XIX

RCA/WGM 8
Seoul

Country Statement

Republic of Korea

1. It is noted that this year marks the last term of RCA's 3rd 5 year cycle. We are most pleased to mention that RCA has contributed significantly to the promotion of the application of nuclear techniques in the region. The Republic of Korea, as a Member State of RCA since 1974, has been greatly benefitted by various RCA projects in industrial use, human health, agriculture, hydrology, basic science utilizing research reactors, and other fields of endeavors. In this regard, my country wants to express its thanks to the Agency for the valuable contributions made to the progress of RCA activities.
2. The present Regional Cooperative Agreement will expire in June of next year. We positively expect that the Agreement will enter into another term to ensure the continuity of this regional cooperative mechanism. With regard to the scheduled extension of the Agreement, however, we would like to suggest that it be extended for another 5 years or longer in order to lessen the unnecessary administrative procedural burden.

3. In parallel with the extension of the Agreement, we do hope that RCA will seek a new phase towards a new generation of its milestone. As some of the Member States have already indicated, we think a certain renewal and revision of the Agreement is necessary mainly to keep up with the regional progress on the application of nuclear techniques.
4. It is noted that some countries among the Member States in the Region such countries as Japan, India, Pakistan, and Korea, have already introduced nuclear power to meet the ever-increasing demand for electrical power generation in an effort to reduce their heavy dependency on oil. Many other countries in the Region are either constructing nuclear power stations or are in the stage of planning to introduce nuclear power to their power generation plan. We certainly believe that nuclear power will play an important and very positive role as a substitute for fossil energy, and will contribute to national economic development as well as to improvement in living standards.
5. I would like to remind everyone here that in the course of implementing RCA programs, the question of defining the term "nuclear science and technology" as described in the Agreement has been raised not a few times.

In this concept, we think of the term "nuclear science and technology" as meaning the techniques which all the Member States need to develop and apply the use of nuclear energy to pursue their prospective future. Therefore, we think "nuclear techniques" embraces not only radiation and isotopes application techniques but also other fields of the peaceful uses of nuclear energy. Most importantly we have to define first of all what are the most important and the most needed nuclear techniques for the common benefit of all Member States in the Region in utilizing those techniques.

6. It is with pleasure that I say that one good example of the practical use of nuclear techniques is the application to human health. In this connection, my country will actively participate in the new project of Medical and Biological Applications of Nuclear Techniques, which is being initiated by Japan. With the ever-growing need for cancer therapy and research in the Region, we believe this new project will eventually greatly contribute to the improvement of human health of all Member States.

7. Concerning the proposed agreement to carry out this medical and biological project, my country has already informed the Agency of its firm intention to establish the cooperative agreement as a participating member. Again, regarding the human health related three new proposals, Korea is pleased to say that all the sub-projects are noted to be very important and necessary to improve modern nuclear techniques for cancer therapy.

Concerning another new proposal about the WASP code application, we think the use of the modified program for planning future nuclear power strategies of each country would be of great value to the individual national power generation plan.

8. We are also pleased to note the fact that the UNDP Industrial Project will enter into its Phase II in the near future, having completed its first 5 years. My country hopes that the Industrial Applications Project will be further accelerated through entering into a new phase of its implementation. Among the various sub-projects, we are happy to report at this meeting that, this year, KAERI has begun carrying out a comprehensive project to survey the use of tracer technology by local Korean industries in their manufacturing lines. This survey project was actually designed by the Executive Management Seminar on Tracer Technology, which was held at KAERI last January .

In the past, we initiated several survey programs, but this new approach intends to give actual advice and consultations by KAERI technical staff members to local industrial companies to encourage the wide use of tracer technology to improve the quality of their products. Meanwhile, we would like to add that each UNDP sub-projects should be focused on the regional common benefit and currently impending need, and that selective implementation would be desirable in some respect for maximum utilization of the fund and capability.

9. Regarding the food irradiation project which was already loaded on Phase II, we are eager to play a key role in its progress, since we are going to have irradiated food available with the installation of a commercial irradiation facility with 500 KCi source in the near future. When the facility is operable, we would like to propose that it be used for the regional purpose in training and demonstration. We also hope that the Agency will give universal guidelines for legal wholesomeness of irradiated food so that all Member States could accept it as discussed during shanghai meeting.
10. Regarding the maintenance of nuclear instruments project, we are pleased to note that a pilot laboratory will be set up shortly at the Korea Cancer Center Hospital.

With the reference activities at this pilot laboratory, we hope to proliferate the use of maintenance techniques of sophisticated nuclear instruments to other local medical institutions. For more practical application needed to develop computer programs for maintenance planning, however, we expect the Agency will strongly initiate the development of the programs of the Member States.

11. Concerning the project on the use of nuclear techniques to improve domestic buffalo production, although my country does not yet participate in this particular project, we have great interest in this field, along with our domestic bovines and horses. We would like to be kept informed about other participating countries' research findings in this field, particularly in the inter-relationship between nutrition, reproduction, disease status and managerial practices.
12. Regarding the new project on the use of nuclear techniques for toxic elements in foodstuffs, we are pleased to note that Korea's National Institute of Health (NIH) is responsible for carrying out this project with the cooperation of the Office of Rural Development (ORD) and KAERI. We think this project should be initiated earlier to generate regional benefit in staple food production.

On the other hand, we sincerely hope that Agency will carefully manage the results of the analyses due to each country facing various situations in staple food contamination.

Last but not least, it is our firm belief that RCA is a very productive vehicle for the application and implementation of nuclear techniques in Asia and the Pacific Region.

Thank you very much.

ANNEX XX

Doc. Ref. 1463e

K.F. Schenk/ew

9 December 1985

PROPOSAL FOR A WASP USER'S WORKSHOP
FOR RCA COUNTRIES

BACKGROUND

Participating countries party to RCA (i.e. Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand and Viet Nam) aim to promote and co-ordinate Research, Development and Training Projects in nuclear fields through collaborative efforts among relevant national institutions in the region (Asia and the Pacific Region). The Agency's role is to provide organizational, administrative, advisory, technical and financial assistance when needed to secure successful execution of the projects undertaken within the framework of the RCA. Fourteen projects are presently implemented under the umbrella of RCA.

Within this framework it would seem desirable to enlarge the scope of RCA to include the Energy Planning Area for discussion at the Working Group Meeting of RCA Countries to be held in Seoul, Republic of Korea, in April 1986.

The Agency's WASP computer methodology has gained worldwide acceptance, both in Member States and in international organizations, as a planning tool for use in medium and long-term electrical generation expansion planning studies and to provide useful indications about the economic optimal share of nuclear power.

By mid-1985 the Agency had transferred the WASP software package to 57 requesting countries and to six international organizations. These countries have used WASP in over 300 electric system expansion planning studies. Many of these studies are part of a detailed economic and planning analysis to determine the need and appropriate role for nuclear energy within the national energy plan. Based on such overall detailed planning studies, some countries have selected nuclear power as the practical answer to their future requirement for electricity, others have chosen alternative sources of electricity as currently preferable to nuclear power programmes, and still others have reserved a final decision.

All but two RCA countries (Bangladesh and Japan) have received the WASP planning methodology and computer program; Bangladesh has participated in the Agency's training course on WASP and has requested Agency assistance to implement the model during 1986. Thus, within the RCA region there is a widespread interest in the WASP methodology for economic planning of electricity generation systems.

PROPOSAL FOR FUTURE ACTIVITY

It is proposed to convene a regional WASP-User's Workshop, on a periodic basis, with the purpose of bringing together experienced WASP Users from RCA countries, together with Agency staff members and consultants, to review the implementation of WASP within the national planning process and to evaluate the generation expansion studies which have been made, and to provide advice on means to improve the use of WASP in such studies, in particular as regards input data: energy and electricity demand forecasts, load duration curves, capital investment costs including construction costs and interest during construction, hydroelectric capacity and energy potential, economic life of generating units, fuel and O & M costs, choice of discount rate and capital and fuel escalation rates, reliability and reserve capacity levels, cost of unserved energy, suitable candidate plants for generation expansion, spinning reserve and maintenance requirements, etc.

Expected Benefits

The following benefits of such a Workshop in the new area of Energy, Electricity and Nuclear Power Planning in RCA Countries are expected:

- . To promote exchange of information and to stimulate co-operation among WASP Users' so that the less experienced users are assisted by the more experienced.
- . To improve the planning capabilities and expertise using WASP.
- . To set generation expansion planning on a firmer footing.
- . To provide feedback to the Agency on the general usefulness and specific applications of WASP.
- . To provide input and advice to those RCA countries that are keeping the nuclear option open.

Costs:	\$15,000 - \$20,000 per workshop
Date:	To be decided
Duration:	2 weeks
Schedule:	Approximately annually, as needed.

PROJECT PROPOSAL

- TITLE:** Computer Treatment Planning in Radiotherapy for RCA project
- PROBLEM:** The number of patients in developing countries receiving radiation therapy is increasing rapidly. Many of them are treated with modern teletherapy units, including accelerators, but with inadequate dosimetry and treatment planning. By proper use of dosimetric equipment and treatment planning systems the efficiency of radiotherapy can be improved considerably.
- BACKGROUND:** IAEA has in the past supported selected radiotherapy departments in developing countries in the use of suitable computer programmes for radiotherapy. Recently, the necessary software became available for treatment planning on various levels of sophistication, using personal computers.
- OBJECTIVE:** To provide central radiotherapy departments in developing countries with the complete computer system (hard and software) for radiotherapy treatment planning.
- PROCEDURE:** Suitable equipment from Japan would be selected and provided to developing countries in the region having proper radiotherapy facilities. Training of local staff would be provided through fellowships in the donor country.
- BENEFITS:** To improve the quality and cure-rate of radiation therapy, and to increase the number of treatments in hospitals in developing countries of the RCA region by applying modern computerized treatment planning.
- DURATION:** 3 years

PROJECT PROPOSAL

Intracavitary radiation therapy for cancer of the uterus in RCA countries

PROBLEM: Cancer of the uterus cervix is prevalent in many developing countries. It is a form of the disease that often strikes women in their younger years, while they are still the support of a growing family in the home. Thus it has important social consequences in addition to the suffering of the individuals concerned. Cancer of the cervix can be detected at an early stage of its development and easily cured by an intracavitary radiotherapy alone. In more advanced cases the combination of intracavitary and teloradiotherapy is needed. Implementation of the radiotherapy technique needs suitable infrastructure, trained staff and equipment.

BACKGROUND: The early detection of cancer of the cervix and its proper treatment have already yielded good results as recorded in many radiation oncology centres world-wide. Intracavitary irradiation using a remote after-loading technique is a simple, highly-effective and completely safe for staff approach compared, for instance, with the manual brachytherapy technique, and could be applied not only for treatment for carcinoma of the cervix but even for treatment of oral cancer if the special oral applicators are available.

OBJECTIVE: The general objective of the project is to disseminate intracavitary radiotherapy of the cervix cancer based on using a remote after-loading technique in RCA countries, where the incidence of carcinoma of the cervix is high and where this approach is either not available or applied only in a limited number of medical centres.

APPROACH: The implementation of the project foresees training staff for ^{as} early as possible detection and treatment of cancer of the cervix and provision of equipment based on using the remote after-loading technique.

BENEFITS: Proper treatment of carcinoma of the cervix and, in some countries, oral cancer, will contribute towards raising the health standards in RCA countries.

ANNEX XXIII

PROJECT PROPOSAL

INTRODUCTION OF MONOCLONAL ANTIBODY TECHNIQUES
TO NUCLEAR MEDICINE WITHIN THE ASIAN REGIONSuggestion for a RCA project with Japanese Collaboration for 1987.

The introduction of monoclonal antibody techniques in nuclear medicine is likely to bring about great advances in the field of 1) immunoscintigraphy for visualisation of pathological lesions in an organ and 2) immunoradioisotope therapy where a radionuclide tagged to a specific antibody can be used for the treatment of a tumour.

The production of specific monoclonal antibodies useful in nuclear medicine requires skillful, meticulous and laborious procedures. Most of the work in this field is at present done in the developed countries but the basic technology is not beyond the reach of some of the developing countries if the clinical usefulness of this area of research gets established in the years to come.

The present proposal envisages distribution of a presently most promising monoclonal antibody against a carcinoma fairly common in the developing countries along with a suitable radionuclide like Indium - 111 for labelling so that scintigraphic studies can be carried out in several developing countries of the Region. The actual labelling procedure will be carried out in the developing country itself. There will be about six to seven countries in this region with the right kind of imaging equipment to participate in this project.

The clinical images obtained in different countries will be analysed primarily by a Japanese group of scientists and the overall data discussed in the RCMS.

A frontier area of research in nuclear medicine will be thus brought to the developing countries with Japanese collaboration and if the initial results are sufficiently conclusive, few of the developing countries can be induced to develop the knowhow of these techniques indigenously.

ANNEX XXIV

PROPOSED NEW PROJECT: THE DEVELOPMENT OF THE INFRASTRUCTURE FOR RADIATION PROTECTION WITHIN RCA MEMBER STATES.

I. INTRODUCTION

Radiation protection is involved practically in all IAEA programmes and activities. Any use or application of radioactive or nuclear material or of any other radiation sources such as particle accelerators and nuclear reactors, must employ appropriate radiation protection measures for both the persons occupationally involved and the general public. In line with its statute, the IAEA plays a central role in establishing and assisting in the implementation of radiation protection standards, guides, recommendations procedures and data. The IAEA also promotes technical co-operation and exchange of information in this area.

As inadequate control of sources of ionizing radiation would inevitably present undue risks for the people involved, the very future of the peaceful utilization of nuclear energy and its by-products depends to a great extent on the effective application of comprehensive radiation protection regulations. An indispensable responsibility of the IAEA is therefore to enhance in Member States an awareness of the need for and an understanding of the measures required to limit individual risk from exposure to ionizing radiation while keeping the remaining radiation detriment as low as reasonably achievable. An initiative by the IAEA has been set which would assist Member States in identifying potential radiation protection problems and in ensuring that adequate protective measures govern the handling, use, storage, transportation and disposal of radioactive material including measures to cope with radiation emergencies. The IAEA has already demonstrated international action in this field in the 1982 Edition of the "Basic Safety Standards for Radiation Protection" jointly sponsored by the IAEA, the ILO, NEA/OECD and WHO.

The need for increased efforts in the area of radiation protection by the IAEA is indicated by the fact that more than 60 developing Member States have already required training and assistance in radiation protection. Many developing Member States are also expecting the Agency's assistance in establishing an effective infrastructure for carrying out all the activities in the field of radiological safety that

are required at a national level. In addition they also need functional systems which will permit that technical, legal and administrative provisions on radiation protection are constantly improved and revised to ensure that these are up to date and effective.

Technical assistance in the field of radiation protection has not always been systematic enough and as a result only a small number of long-term, regional and interregional co-ordinated projects were formulated. Most requests of developing Member States generally dealt with rather limited programmes carried out by various institutions or universities. Furthermore, the resulting small, usually short-term, technical co-operation activities often had no proper follow-up later.

Increased efforts need to be made to assist interested Member States in the implementation of the Basic Safety Standards for Radiation Protection and consequently longer-term strategies in this field need to be created. The present practice indicates a certain emphasis on projects related to nuclear power and other uses of nuclear energy for peaceful purposes. However, the scope of activities in Member States regarding the application of radioisotopes or ionizing radiation in medicine, agriculture, animal sciences, industry, research and development is, in many cases, much larger. Therefore, many developing countries need an adequate assessment and longer-term co-ordinated technical assistance in radiation protection in these areas.

II. RADIATION PROTECTION AND THE RCA PROGRAMME

The aim of the RCA is to promote coordinated research, development and training projects in nuclear science and technology between appropriate institutions and with the IAEA's assistance. At present, fourteen projects are included within the RCA umbrella. Of these, five are directly associated with the applications of large radiation sources. Others are concerned with the fields of nuclear medicine, agriculture and water resources. The major activity is the "UNDP Industrial Project" which encompasses the following sub-projects: tracer technology in industry, non-destructive testing, radiation technology, and nucleonic control systems. Success in all these areas will lead to increased demands for radiation protection services.

III. PROPOSED PROJECT

Regional cooperation is directed towards increasing the level of self-reliance by pooling regional resources. Fundamental to the implementation of the RCA programme is the availability of a sound technical and organizational base for radiation protection.

The aims of the proposed project are:

- (i) to assess the needs for radiation protection within the region and the levels of human and technical resources to meet the needs; and
- (ii) to contribute to the building up of radiation protection infrastructure through coordinated research and training activities.

IV. IMMEDIATE OBJECTIVE

Subject to the formal recommendation of RCA Member States and to the availability of funding, it is proposed to call a project Formulation Meeting to discuss the issues outlined above and to plan a detailed programme.

ANNEX XXV

PROJECT PROPOSAL

RCA Project: DEVELOPMENT OF THE INIS CAPABILITY IN ASIA AND
THE PACIFIC REGION

Funding: 1986, extrabudgetary contribution from the
Government of Japan (\$20,000)

Project Officer: Mr. I. Marchesi, DIR, NESI

The general aim of the project would be:

"Establish or improve the local Nuclear Information Structure
both through local or regional means"

The phases would be :

- A survey to assess the existing (if any) nuclear information capacity
in the countries of a region and their level vis-à-vis the corresponding
Nuclear Programmes.
- Design of a plan of action to help such countries to establish or
improve their structure at a level compatible with their Nuclear
Programmes
- Implement the plan, through
 - advice and acceptance
 - training, both at the technical and the managerial levels
 - provision of material and equipment (if needed)
 - implementation consultancy

The general approach would be :

- Case by case analysis to determine whether a local or regional solution
might fit best .
- Utilization of existing local or regional resources as much as possible.
- Central coordination in TC|IAEA with specific extra-budgetary resources.

Proposed Timetable:

21 February 1986	Preliminary discussions with Japanese officials
29 April - 3 May 1986	RCA Working Group Meeting, project to be discussed
9 June 1986	Formal responses expected from Member States
October/November 1986	Project formulation meeting, Japan. Development of plans for project implementation (including budget).
1987 onwards	Project implementation.

ANNEX XXVI

Project Title: THE USE OF INDUCED MUTATIONS FOR IMPROVEMENT OF
GRAIN LEGUME PRODUCTION IN SOUTH EAST ASIA

Project Officer: A. Micke

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

Project Description: The purpose of the coordinated research project is to combine the efforts of SEA plant breeding institutions in developing better cultivars of the various grain legumes by using induced mutations. The aims are diversified according to the 10 target plant species, including disease resistance, yield, quality, plant architecture, nitrogen fixation, maturity time, etc.

The coordinated research programme was extended till 1986 on a "no-cost basis". Co-operators continue to work towards developing better pulse varieties without Agency support.

Major activities (1985): Further selection and evaluation of grain legume mutants. Use of mutants in cross breeding.

Major activities proposed for 1986: Final research coordination meeting at Pullman, WA (USA), 1-5 July 1986, prior to the Food Legume Research Conference.

ANNEX XXVII

Project Title: SECOND PHASE OF ASIAN REGIONAL CO-OPERATIVE PROJECT ON FOOD IRRADIATION (RPFI PHASE II)

Project Officer: Paisan Loaharanu

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

Project Objective: To co-ordinate pilot/commercial scale experiments on specific applications of food irradiation with direct participation of local food industry to facilitate the transfer of the technology. Emphasis will be given to the applications of food irradiation on

- (a) disinfestation and decontamination of stored products,
- (b) improvement of hygiene and storage ability of processed seafood,
- (c) insect disinfestation of fruits for quarantine purposes, and
- (d) sprout inhibition of onions and potatoes.

Major Activities:
(1985)

1. Workshop on Commercialization of Ionizing Energy Treatment of Foods, Lucas Heights, Australia, 29 April - 10 May 1985

The workshop was attended by 18 participants from 8 countries which collaborate under the scope of RPFI Phase II plus 2 observers from New Zealand. The objective of the workshop was to demonstrate the efficacy of pilot-scale ionizing energy treatment of food items of interest to the region, e.g. seafood, fruit, spices, onions, etc.

2. First Project Committee Meeting of RPFI Phase II, Lucas Heights, Australia, 13-15 May 1985

The meeting was attended by representatives of 8 Governments party to the RPFI Phase II. The meeting considered and agreed on the distribution of work to be carried out during the next three years with emphasis on technology transfer of food irradiation to relevant industries. A resolution was adopted at the meeting to facilitate harmonization of legislation on food irradiation and trade in irradiated foods in the region.

3. Research Contract Programme

Based on the recommendation of the Project Committee, following research contracts and agreements were concluded:

<u>Country</u>	<u>Contract/ Agreement No.</u>	<u>Title</u>
AUSTRALIA (P.A. Wills)	4239/CF	Technology transfer for ionizing treatment of food
BANGLADESH (M. Ahmed)	4217/AG	Commercialization, storage and transportation studies of irradiated dried fish and fishery products and onions
INDONESIA (M. Maha)	4208/AG	Technology transfer of irradiation of frozen shrimps, dried fish and spices
KOREA, Republic of (H.O. Cho)	4238/CF	Approach to the commercial storage of dried fish, onions and garlic and evaluation of its marketing and consumer acceptance
MALAYSIA (F.M. Arshad)	4258/AG	Economic feasibility study on the use of gamma irradiation for treatment of black and white peppers
PAKISTAN (I. Khan)	4216/AG	Commercial trials on radiation preservation of onions under tropical conditions
PHILIPPINES (C.C. Singson)	4234/RB	Pilot plant studies on the techno-economic feasibility of food irradiation in the Philippines
THAILAND (K. Nouchpramool)	4279/AG	The application of gamma-irradiation for the extended commercial storage of root crops

In addition, research contract proposals have recently been received from Sri Lanka and Vietnam for possible inclusion in RFFI-Phase II.

4. Multipurpose/Commercial Irradiators

The following countries have constructed or are constructing or plan to construct irradiators available also for treating food:

<u>Country</u>	<u>No. of Irradiators</u>	<u>Location</u>
AUSTRALIA	2	Sydney*, Brisbane***
BANGLADESH	2	Dhaka, Chittagong**
KOREA, Rep.of	2	Seoul***
PAKISTAN	1	Lahore***
PHILIPPINES	1	Quezon City**
THAILAND	1	Bangkok***
VIETNAM	1	Hanoi***

Major Activities Proposed for 1986

1. RCM on RPFI Phase II:

The RCM will be held as part of the FAO/IAEA Seminar for Asia and the Pacific on the Practical Application of Food Irradiation, Shanghai, China, 7-11 April 1986. Nine scientists who are contract or agreement holders have been invited to attend the RCM and the Seminar.

2. Second Meeting of the Project Committee of the RPFI Phase II

The meeting will be held at the Institute for Application of Atomic Energy, Zhejiang Academy of Agricultural Sciences, Hangzhou, China, 14-15 April 1986. It is expected that representatives of 11 Governments which are party to the Agreement Establishing the RPFI Phase II will attend. The meeting will review the results of work carried out in different countries in the past year, especially on legislative framework for food irradiation in the region. Action plans to transfer the technology to local industry and trade in irradiated food in the region will also be considered.

* complete
** under construction
*** being planned

ANNEX XXVIII

Project Title: THE USE OF NUCLEAR TECHNIQUES TO IMPROVE DOMESTIC BUFFALO PRODUCTION IN ASIA - PHASE II

Project Officer: Dr. M.C.N. Jayasuriya

Participating Member States: Malaysia, Sri Lanka, Bangladesh, Pakistan, Philippines, Thailand, Japan, Australia, Vietnam, China, India and Indonesia.

Project Description:

Of the 140 million water buffaloes found in the world over 95 million are located in the Asian region. They are primarily used for meat and milk production and in recent years their importance as a source of draught power has also been recognized, particularly at the small-farm level. The Joint FAO/IAEA Division initiated a multidisciplinary coordinated Research Programme in 1978 with the aim of improving the productivity of the domestic buffalo in Asia. The project terminated in 1984 but in view of its success, the programme has been extended to Phase II. Similar to the previous programme, Phase II will also be directed towards improving the productivity of swamp and river buffaloes in the Asian Region but an integrated multidisciplinary approach to study the interrelationship between nutrition, reproduction, disease status and managerial practices is being promoted.

Major activities 1985: 14 Research Contracts and six research agreements were awarded during 1984/85.

Major activities 1986:

The 1st Research Coordination meeting was held in Bogor, Indonesia at the Centre for Research in Animal Science (CRIAS) from 27-31 January 1986. 13 Contract holders and 6 Agreement holders from 10 countries attended the meeting. Contract holders from China and India failed to attend the meeting. The meeting was ceremonially opened by the Director General of the National Atomic Energy Agency, Dr. Jali Ahimsa after which the key note address was delivered by Dr. B.K. Soni, FAO Regional Animal Production and Health Officer for Asia and Pacific.

At the end of 21 scientific paper presentations, group discussions were held to draft conclusions and recommendations for future research in the areas of nutrition, reproduction and health aspects of the indigenous buffalo in Asia. Emphasis was placed on the importance of integrated multidisciplinary approach to research in solving the practical problems of buffalo production, particularly at the small farm level.

During group discussions, individual work plans were prepared by the contract holders in consultation with the agreement holders to cover the period February 1986 until next RCM; a period of approximately 15-18 months. The Sri Lankan participants also indicated their willingness to host the next RCM in Colombo.

The renewal of 14 research contracts and 6 research agreements are foreseen for 1986. This would amount to approximately US\$55,000.--.

Encl. Copy of Final Programme of RCM held in Indonesia.

REPORT ON CO-ORDINATED RESEARCH PROGRAMME ON
RADIATION STERILIZATION PRACTICES FOR TISSUE GRAFTS
IN CLINICAL USE FOR ASIA AND THE PACIFIC REGION
UNDER THE RCA PROGRAMME

ANNEX XXIX

PROJECT OFFICER: R. MUKHERJEE

The Agency co-ordinated programme of research (CRP) on radiation sterilization practices development for suitable non-viable tissue grafts for safe clinical/surgical use in the Member States in Asia and the Pacific region has continued to make encouraging progress within the framework of the Regional Co-operative Agreement (RCA) programme. The IAEA CRP has to date participants from the relevant research institutes in Australia, Bangladesh, China, India, Indonesia, Pakistan, Philippines, Sri Lanka, Thailand and Viet-Nam. Interest has also been recently expressed by a relevant health-care institute in the Republic of Korea (South) to participate in the CRP and a research proposal prepared for submission in collaboration with the Korea Advanced Energy Research Institute (KAERI) is awaited. Continued technical and research co-ordination is maintained between the CRP and the relevant tissue banking establishment in Rangoon, Burma, as the regional non-RCA Member State. Tissue banking in Burma has been established through the Agency's Research and Technical Co-operation programmes (TC BUR/7/004) and the associated experiences help provide guidance in the action plan suited for the region and for the current RCA programme.

The RCA programme concerned on tissue graft radiation sterilization practices basically represents an 'extension' of the corresponding radiation sterilization practices sub-programme on medical supplies as promoted and progressively elevated to an industrial operational base under the support of the UNDP/RCA/Industrial Project for Asia and the Pacific region. This field of extrapolation, while availing the appropriate advantages of common experience and irradiator facilities sharing, also recognizes the potential role to be played by the distinctive technical radiobiological/radiochemical features of the tissue grafts for their sustained clinical/surgical utility and the wellbeing of patients. Consequently, new sets of technical data and information are considered as necessary on the topics of radiation interactions with the biological tissue components and with those of cellular and organic matrices in the tissues concerned, whose state of integrity and conservation as appropriate could often play a significant role in the overall clinical quality and merits of the resultant sterilized graft. The current primary phase of the CRP programme thus aims to achieve this promotional goal for the beneficial nuclear applications to help up-grade the health-care services through the following work schedule:

- (a) Improvement and hygienic standardization of the tissue procurement and pre-sterilization processing steps, using radiation microbiology and suitable radioisotopic tracer techniques.
- (b) Regulation of the effects of sterilizing radiation doses on the residual (post-washing) organic and inorganic tissue components induced with or without the stresses from freezing and/or freeze-drying processes.
- (c) Use of techniques involving radiotracers, monoclonal antibody and relevant labelled antigens among others, to help identify and evaluate the role(s) of graft-specific biogenic factor(s) leading to the clinical success of a tissue graft concerned.
- (d) Radiation effects studies on specific tissues of significance as non-viable tissue grafts for surgical applications, such as bone, chorion amnion membranes, skin dressings, fascialata, duramater, nerve, tendon, cartilages.

Most RCA countries in the Asia and Pacific region are relatively new in the development of their indigenous resources and practices for tissue grafts. In the absence of their national tissue banking facilities, almost all tissue grafts in clinical/surgical use therefore consist of imported commercial items. The recent awareness in the region of the potential beneficial deployment of the indigenous tissue resources from human cadaveric origin for health-care services and the transfer of relevant techniques and technology from the established tissue banks in North America and Europe have imparted new impetus among the investigator scientists of the CRP. Depending upon the locally-available technical facilities and the resources of tissues for graft development research, the different investigators are working on a number of tissue types. The CRP provides an ideal forum for exchange and dissemination of technical information on these matters among the investigators concerned.

The results generated through research carried out under the CRP are planned for co-ordinated discussion and review in a Research Co-ordination Meeting (RCM) to be held in Colombo, Sri Lanka, in November 1986. The scope of discussion for this field and dissemination of relevant current techniques are expected to be widened through concomitant holding of an RCA Regional Training Course on the field of tissue graft sterilization by radiation and tissue banking practices sponsored under the UNDP/Industrial Applications Project to be held at the same location. The programme of the Training Course and that of the CRP research anticipates exploration of suitable means of adapting the technical protocol concerned to facilitate industrial-scale operation based upon the industrial radiation processing of medical supplies for sterilization.

Budget (1986)

Research contracts including new projects and renewals	US \$25 000
RCM (E3-RC-343)	US \$17 000
Total	<u>US \$42 000</u>



RCA PROJECT ON THE MAINTENANCE OF NUCLEAR INSTRUMENTS

Progress report 1985

1. Scientific Officer: P.H. Vuister
2. The activities in the four main fields of activity have all continued, but the emphasis has been on maintenance management.
3. The yearly meeting has been held in Vienna in September, in conjunction with a research coordination meeting on the same subject in Latin America and with a Symposium on Nuclear Medicine in Developing Countries. The contacts made during these meetings were fruitful.
4. During this year activities on power-conditioning and its quality control continued. Drop-out relays are now distributed by the Agency for several TC projects. An exposition on power-conditioning was prepared during the above-mentioned symposium.
5. A draft for lectures on air-conditioning was prepared.
6. Several national training courses were conducted. A proposal for a specific interregional project on the promotion of local training has been prepared.
7. A new computer programme on the management of preventive maintenance is now under development. It is written in dBase III, for which in 8 of the participating countries personal computers and software is available. The gradual improvements of the programme can therefore easily be taken over by all participating institutes.
8. A new approach to the task distribution on maintenance among the different categories of persons involved in instrumentation is being developed in conjunction with this programme.
9. Both the activities under 7 and 8 try to cope better with the effects of brain-drain.
10. The programme for the final year of this project contains:
 - a) The further development of the computer program on maintenance planning, the preparation of maintenance protocols, and maintenance task distribution. This work is supported by an itinerant expert who has visited until now four countries and who will visit the other ones in the near future;
 - b) The preparation of TECDOC on power-conditioning;
 - c) The effective establishment of regular preventive maintenance in the pilot laboratories.
11. A TC field evaluation of the results of the project in three or four of the participating countries will be conducted.
12. A final project committee meeting will be held in September in Bangkok.

Project Title:

NUCLEAR TECHNIQUES FOR TOXIC ELEMENTS IN FOODSTUFFS.

Project Officer:

Eduardo Cortes Toro 

Participating Member States:

Australia, Bangladesh, China, India*, Japan*, Malaysia, Pakistan, Thailand
(*contracts recommended for approval but not yet signed).

In addition, the following Member States have indicated their intention of joining the programme: Indonesia, Republic of Korea, Philippines, Sri Lanka.

Member States from outside the region which are contributing to the programme as "associate participants" are: Argentina, Brazil, Jamaica.

Project Description:

The purpose of this CRP is to obtain comparative data on the existing elemental concentrations of potentially toxic elements in foodstuffs in various Asian countries. The samples to be collected and analysed are foodstuffs which should be representative of the food most commonly consumed by each of the population groups concerned. The elements to be studied include the potentially most important toxic trace elements (As, Cd, Cr, Hg, Pb, Se). It is expected to use nuclear analytical techniques, such as neutron activation analysis (NAA), for the determination of these elements (except Pb). Emphasis is placed on analytical quality assurance.

The data collected will be used to compare actual concentrations of toxic elements in individual foodstuffs with maximum permissible concentrations, and actual dietary intakes with provisional tolerable intakes, as specified in national legislation and/or international guidelines.

An important supplementary purpose of the programme is to help establish analytical expertise for work of this kind in the individual countries. Such laboratories will then be able to offer analytical quality control services, and to provide validation support, for their own national food monitoring programmes.

Major activities in 1985:

The programme was initiated late in 1985. Eight research contracts and a research agreement had been awarded by the end of December. The total budget involved in these contracts is \$ 48,200, including \$ 15,000 for 3 "associate participants" from countries outside the RCA region.

Major activities in 1986:

The programme is expected to expand to about 12 participants from the RCA region. The provisional budget is \$ 50,000. A research co-ordination meeting will be held somewhere within the region, but the place and dates have not yet been decided.

ANNEX XXXII

Project Title: ISOTOPE APPLICATIONS IN HYDROLOGY AND SEDIMENTOLOGY

Project Officer: B.R. Payne

Participating Member States: Australia, Bangladesh, Indonesia,
Republic of Korea, Malaysia, Philippines,
Sri Lanka, Thailand

Project Description: The project has introduced the capability of using environmental isotope techniques in hydrology in the region. Analytical facilities have been established in most of the countries party to the project. Within a Co-ordinated Research Programme these techniques have been applied to a number of hydrological problems.

Major Activities (1985): The Co-ordinated Research Programme is now drawing to a close and reports have been prepared by a number of institutions on the results of research.

Major Activities Proposed for 1986: It is expected that the remaining contracts which are operational will be concluded this year. Advisory services are planned to assist with the interpretation of the data from some of the field studies. Consideration is being given to the organization of a workshop in the region which would be primarily oriented to hydrologists at the management level to advise them of the potential use of these techniques as an additional hydrological tool.

ANNEX XXXIII

Project Title:

SEMI-DWARF MUTANTS FOR RICE IMPROVEMENT IN ASIA AND THE PACIFIC REGION

Project Officer: M. Maluszynski

Participating Member States:

Bangladesh, India, Indonesia, Malaysia, Pakistan,
The Philippines, Republic of Korea

Project description:

The coordinated research programme was established to identify and make available by mutations breeding new sources of semi-dwarf plant type for lodging resistance in rice. Such sources would open possibilities for varietal improvement beyond the limits set by the presently used gene sources. To also make available in improved genotypes other desirable mutant genes such as those relating to earliness, plant architecture and resistance to various stress factors.

Major activities (1985):

Further selection and evaluation of semi-dwarf mutants of rice. Continuation of cross-breeding programme with the use of promising mutants of rice.

2nd Research Co-ordination Meeting which was held on May 20-24, 1985 in Japan.

In each laboratory participating in this programme, semi-dwarf mutants were induced and selected in M₂ and following progenies. More promising mutants, possessing other desirable characters, are now being screened for their yielding potential and other agronomically important traits. Five semi-dwarf mutants have already been found as being non-allelic to the main known semi-dwarfness gene, and these mutants will be utilized in cross breeding programmes in three countries. This will help to avoid genetic vulnerability in rice varieties resistant to lodging.

Major activities proposed for 1986:

The genetic as well as agronomic evaluation of new semi-dwarf stocks should be continued for a minimum of two years - till 1987. All semi-dwarf stocks obtained in this programme, especially those non-allelic to the DGWG-gene, should be made available during this two year period for practical plant breeding. This is very important for the improvement of rice in many countries of Asia and the Pacific region.

ANNEX XXXIV

Project Title: IMPROVEMENT OF CANCER THERAPY IN ASIAN COUNTRIES BY THE COMBINATION OF TREATMENT BY CONVENTIONAL RADIATION AND PHYSICAL OR CHEMICAL MEANS

Project Officer: Y. Skoropad

Participating Member States: India, Japan, Malaysia, Pakistan, Singapore, Sri Lanka, Thailand

Project description: The co-ordinated research programme (CRP) began in late 1982. Four of the participants joined during 1983. One of the contracts was changed into a scientific agreement on the wishes of the contractor (S. Krishnamurthi, India). At present the programme includes 9 participants from 7 Member States from the South-east Asia and Pacific region. Of these, three are agreement holders (Japan (two) and India (one)) and six are contractors (India (one), Malaysia (one), Pakistan (one), Singapore (one), Sri Lanka (one) and Thailand (one)). The programme aims mostly at clinical studies on the combination of conventional radiotherapy with chemical radio-modifiers and hyperthermia and is expected to improve the radiation therapy techniques especially in developing countries of South-east Asia and the Pacific region.

The programme as a whole is going on well. Agreement holders and contractors are continuing their investigations according to the plans adopted. In addition to the planned work, the Indian contractor has extended his experiments with chemical sensitizers to cover the use of hyperthermia and the contractor from Thailand is also using the antibiotic mitomycin "C". Since the production of the chemical sensitizer misonidazole and its derivatives was discontinued and they were taken off the market, the contractors from Sri Lanka and Singapore had to replace them with available drugs and chemicals and had to redesign their projects. The project of the contractor from Sri Lanka is now continuing successfully based on a similar protocol of another programme participant from India. The contractor from Singapore faces difficulties in gathering suitable patients for treatment, which results in rather slow progress of the project. Therefore, in spite of very interesting results from the investigations, the contractor does not intend to renew his project in 1986. Despite several contract extensions from August 1982 until recently, the participant from Pakistan could not yet start his project because of the delay in purchasing a microwave hyperthermia unit by the national authorities. Thus, the Agency will have to take the decision on discontinuing this project. It is planned to complete the programme in 1987.

Major activities (1985): Dr. T. Sugahara, an Agency research agreement holder, visited the Agency for one day on 28 May 1985 and discussed matters relating to the programme, especially the Agency's suggestion to postpone its next research co-ordination meeting (RCM) from 1985 to 1986. It was agreed that the RCM will be held in Vienna in August-September 1986 (jointly with another Agency RCM on a similar subject) and, in the meantime, Dr. Sugahara, or one of his staff, would make personal contacts with the participants of the CRP by visiting them in their institutions. He would discuss with them the progress of the project, any difficulties they may have, and at the same time looking at the facilities and the set-up of their departments. It was believed that these visits would stimulate and motivate them, especially if Dr. Sugahara and the Agency could help solve the difficulties they may be facing, e.g. obtaining the sensitizers or operating the hyperthermia machines. According to this decision, Dr. Y. Onoyama, an Agency agreement holder from Japan, and Dr. Kano, a radiobiologist and his colleague from Japan, undertook their visit to Pakistan, Sri Lanka, Thailand and Singapore from 9 December to 22 December 1985. According to preliminary information, the above-mentioned visit was useful. More about it will be in the report of Drs. Onoyama and Kano to the Agency, which is in preparation.

Major activities proposed for 1986: Another team, consisting of Dr. T. Sugahara and his colleague, a clinician from Japan, Dr. Y. Tanaka, will visit the rest of the programme participants in India (Madras and Bombay) and Malaysia from 18 February to 1 March 1986.

The RCM will be held in Vienna in August-September 1986 jointly with another Agency RCM on a similar subject. This will give the participants of both Agency programmes the additional opportunity of widely discussing the results achieved and exchanging information. In addition, the participants of the RCM's will have the opportunity of taking part in the IAEA/WHO International Symposium on Radiotherapy in Developing Countries - Present Status and Future Trends, which will be held in Vienna at the same time.

YSkoropad/dw

Project Title:

NUCLEAR TECHNIQUES FOR THE DIAGNOSIS OF TROPICAL PARASITIC DISEASES IN ASIAN COUNTRIES

Project Officer:

J.B. CASTELINO

Participating Member States: No. of Participants 10

Research Agreement - Australia
Research Contracts - Bangladesh
India (2)
Indonesia
Korea
Malaysia
Pakistan
Sri Lanka
Thailand

Project Description:

The project seeks to evaluate the potential of existing immunoradiometric assays, used in combination with monoclonal or polyclonal antibodies to detect parasite antigens in sera and urine of patients with filariasis, schistosomiasis or malaria; and to assess the reliability of these methods for predicting the level and stage of infection in man under endemic conditions.

Major Activities (1985):

Sera and urines from patients with filariasis were assayed using RIA techniques and antifilarial monoclonal antibodies supplied by the Walter & Eliza Hall Institute of Medical Research, Melbourne and the Pasteur Institute, Lille, (France). Work on the development of a solid phase RIA for malaria was performed at some of the institutes and the institute at Bangkok developed a monoclonal antibody which, in preliminary analysis, shows a good immunodiagnostic potential.

Results from these studies were discussed at a research co-ordination meeting in Vienna during August 1985. Three papers (Australia, India, Thailand) on this work were presented at the Agency's International Symposium on "Nuclear Medicine and Related Medical Applications of Nuclear Techniques in Developing Countries".

Major Activities proposed for 1986:

- a. Evaluation, in immunoradiometric assays, of new anti-filaria and anti-schistosome monoclonal antibodies supplied by institutes at Melbourne and Lille.
- b. Evaluation of the anti-malaria monoclonal supplied by the institute at Bangkok; and continued work at various institutes on developing anti-malaria poly- or mono-clonal antibodies with immunodiagnostic potential.

c. Research Co-ordination Meeting at Kuala Lumpur to review the results obtained.

The CRP will be completed early in 1987.

Estimated Budget 1986:

Research Contract Renewal(4)	\$ 19,000
Research Co-ordination Meeting (September 1986)	\$ <u>14,000</u>
Total	\$ <u>33,100</u>

ANNEX XXXVI

Project Title: QUANTITATIVE EVALUATION OF NUCLEAR MEDICINE IMAGING PROCEDURES FOR THE DIAGNOSIS OF LIVER DISEASES

Project Officer: A. Wegst (till August 1985)
R. Ganatra (since August 1985)

Participating Member States:

Bangladesh, India, Japan, Pakistan, Philippines,
Thailand, Singapore, South Korea, Sri Lanka,
Viet Nam.

Project Description:

The project has two aspects: 1) Evaluation of the performance quality of the imaging instruments available in different countries of this region by R.O.C. (Receiver operating characteristics) analysis of images of IAEA/WHO designed transmission liver phantom, 2) Evaluation of interpretations of 116 representative clinical liver images from Japan by various physicians of the participating countries on the basis of quantitative scores by R.O.C. analysis.

Major activities (1985):

During the year, performances of 27 gamma cameras and 18 rectilinear scanners from different countries were analysed. There appears to be subtle differences in the ability of the various instrument-observer units to detect areas of decreased count rate in the IAEA/WHO phantom when comparing one country to another. On the other hand, there seems to be no difference in the detectability when the imaging instrument is either a rectilinear scanner or a scintillation camera.

Image interpretation by 49 physicians from 7 different countries were analysed by a similar R.O.C. technique. The differences in the detection of space occupying lesions were less marked from one country to another when compared to the differences observed in the interpretation of diffuse liver diseases.

Major activities proposed for 1986

Both the above types of analysis will be continued and a larger sample size will be obtained to reach definitive conclusions. Each participating country would select at least 25 images of liver diseases common in that country and send them to Japan for processing and distribution to various participants for R.O.C. analysis of interpretations.

ANNEX XXXVII

Project Title: DEVELOPMENT OF ^{99m}Tc GENERATORS USING LOW-POWER RESEARCH REACTORS

Project Officer: H. Vera Ruiz
Industrial Applications and Chemistry Section

Participating Member States: Australia, India, Indonesia, Malaysia, Thailand and Viet Nam

Dr. R. Boyd CF/3381
Australia

Dr. R.S. Mani CF/3382
India

Dr. A. Hanafiah Ws. RC/3412
Indonesia

Dr. R. Mohamad RC/3646
Malaysia

Dr. P. Prakongvong RC/3413
Thailand

Dr. Le Van So (Proposal received and recommended
Viet Nam for approval)

Project description: The aim of this CRP is to develop an appropriate technology for the preparation of ^{99m}Tc generator systems using medium to low specific activity (η, γ)-produced ⁹⁹Mo. The research efforts are primarily directed toward the development of a simple, economical, compact and transportable generator system for safe use in the environment of a radiopharmaceutical unit of a hospital. The research protocol includes one or more of the following tasks:

- Optimisation of reactor production yields of the ⁹⁸Mo (η, γ)-⁹⁹Mo reaction using only inexpensive molybdenum compounds in natural abundance.
- Assessment of the effects of increase neutron irradiation on the Mo targets and on the ^{99m}Tc elution efficiencies, as well as physico-chemical characterisation of the Mo targets.
- Further assessment of the available generator technologies, particularly the solvent extraction and sublimation type.
- Searching for alternative and novel approaches and technologies that would produce a generator from (η, γ)-⁹⁹Mo with performance characteristics similar to the fission ⁹⁹Mo-based chromatographic generator.

- Thorough quality control tests through detailed investigations of the parameters indicative of the generator performance.

Major Activities
(1985):

- Research Co-ordination Meeting.
The first Co-ordination Meeting was held at the Office of Atomic Energy for Peace (OAEP), November 11-14, 1985. The Meeting was attended by all research contract and agreement holders from the South East Asia and Pacific Region currently participating in the CRP.

The Meeting's Report is attached hereto.

- A new research contract proposal received from Vietnam (F2.00.00-Vie-13722) was recommended for inclusion into the CRP starting from the beginning of 1986.
- In view of the promising results achieved thus far, particularly of the gel generator and of the advanced low temperature sublimation generator, and that the full development of these new technologies requires the support of the Agency, a request for a two-year extension (1986-1987) of the CRP was proposed in January 1986.

Major activities
proposed for 1986:

Independent testing of the low temperature sublimation generator.

The low temperature sublimation ^{99m}Tc generator currently being developed in Hungary (Research Contract No. 3361) is particularly well suited for use with low specific activity ^{99}Mo produced in low power research reactors. This type of generator, together with the gel generator being developed in several Asian countries and Australia, when fully developed, promise long term solutions to the difficulties existing in developing countries of a regular and economical supply of ^{99m}Tc for medical use.

During the Bangkok meeting it was strongly recommended that the sublimation generator be subjected to detailed evaluation and testing at centres which have adequate experience in various generator systems. Therefore it is proposed to arrange for the acquisition of two sublimation generator units from Hungary (\$ 3000 each) and send one to Australia (Mr. R. Boyd) and the other one to India (Dr. R.S. Mani) for a thorough testing.

A joint co-ordination meeting between the two subgroups of this CRP (Europe and South East Asia and Pacific) is proposed for early 1987. It is proposed to hold this meeting either in India or Malaysia. This should be discussed perhaps during the next Eighth RCA Working Group Meeting.

PART III

1. New Project Proposals
2. RCA Budget and Action Plan
3. Timetable for implementation of the new RCA Agreement.

Table 1

ANNEX XXXVIII

1986 RCA Action Plan

Project	Government	IAEA
	Contribution US\$	US\$
UNDP regional project on industrial application of isotopes and radiation technology	883 145	895 000 (UNDP) 82 800 (TC) ¹
Use of induced mutations for improvement of grain legume production		30 000 (CRP)
Mutation plant breeding (training course)		110 000 (TC)
Regional project on food irradiation Phase II	90 000 AUL ² 2 000 JPN ³	55 000 (TC)
Nuclear techniques to improve domestic buffalo production		55 000 (CRP)
Sterilization of biological tissue grafts		42 000 (CRP)
Nuclear techniques for toxic elements in foodstuffs		50 000 (CRP)
Environmental research monitoring (training course)		65 000 (TC)
Maintenance of nuclear instruments		65 200 (CRP)
Basic science using research reactors	50 000 IND	
Isotope applications in hydrology and sedimentology	50 000 AUL ⁴	13 500 (CRP)
Semi-dwarf mutants for rice improvement		37 000 (CRP)
Nuclear medicine (training course on radioimmunoassay)	40 000 IND ⁵	
Data processing in RIA (training course)		65 000 (TC)
Improvement of cancer therapy	49 900 JPN	18 200 (CRP) 100 000 (TC)
Imaging procedures for the diagnosis of liver diseases	80 000 JPN	
Nuclear techniques for tropical parasitic diseases		38 100 (CRP)
Development of Tc-99m generator systems		63 300 (CRP)
New projects ⁶		
- Medical and Biol. Applications (JPN)		
- Medical and Biol. Applications (ROK, foreshadowed)		
- WASP Users Workshop		20 000
- INIS Development - RCA Countries		
Working group meeting		4 000

NOTES TO TABLE 1

- 1) TC = Department of Technical Cooperation; CRP = Coordinated Research Programme.
- 2) AUL - Australia, IND - India, JPN - Japan.
- 3) Part of the residual funds from RPI Phase I.
- 4) Residual funds from the Australian contribution to the project on isotope hydrology.
- 5) Funds carried over from 1985.
- 6) New projects are subject to acceptance by RCA Member States.

1987 RCA Cost Projection

Project ¹	Government ² Contribution US\$	IAEA US\$
UNDP regional project on industrial application of isotopes and radiation technology	3)	3)
Use of induced mutations for improvement of grain legume production		
Regional project on food irradiation Phase II	90 000 AUL	
Nuclear techniques to improve domestic buffalo production		75 000
Sterilization of biological tissue grafts		35 000
Nuclear techniques for toxic elements in foodstuffs		55 000
Maintenance of nuclear instruments		65 000
Basic science using research reactors	50 000 IND	3 000
Semi-dwarf mutants for rice improvement		56 000
Improvement of cancer therapy	49 900 JPN	
Training course on radiochemistry for medical physicists		100 000
Imaging procedures for the diagnosis of liver diseases	80 000 JPN	
Training course on quality control of nuclear imaging instruments	100 000 JPN	
Development of Tc-99m generator systems		46 000
New projects⁶		
- Medical and Biol. Applications (JPN)		
- Medical and Biol. Applications (ROK, foreshadowed)		
- WASP Users Workshop		20 000
- INIS Development - RCA Countries		
Working group meeting		4 000

NOTES TO TABLE 2

- 1) The following coordinated research programmes terminated during 1986:
 - a) The use of induced mutations for improvement of grain legume production;
 - b) Isotope application in hydrology and sedimentology;
 - c) Nuclear techniques for tropical parasitic diseases.

- 2) In assessing the likely level of activity in 1987, it has been assumed that the level of extra-budgetary support provided by Governments will remain constant. This of course implies no commitment on the part of the Governments. Abbreviations used are: AUL - Australia, IND - India, JPN - Japan.

- 3) A proposal for Phase II of the industrial project has been foreshadowed to UNDP. A detailed project document is being prepared.