

**9TH MEETING OF REPRESENTATIVES
OF RCA MEMBER STATES**

R E P O R T

**Colombo, Sri Lanka
23 - 26 March 1987**

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1. INTRODUCTION.

The Ninth RCA Working Group Meeting was hosted by the Atomic Energy Authority of Sri Lanka (AEA) and held at the Bandaranaike Memorial International Conference Hall, Colombo, 23 - 26 March 1987. It was attended by 22 delegates from 11 Member States and 3 from the IAEA. A list of attendees is attached (Annex 1).

2. OFFICIAL OPENING.

The meeting was officially opened by the Honourable A.C. Shahul Hameed, Minister of Foreign Affairs of Sri Lanka at a ceremony conducted in the evening of 23rd March.

In his opening remarks, Dr. Dharmawardena, Chairman of the AEA welcomed delegates to Sri Lanka. He pointed out that the Ninth Working Group Meeting had special significance because it marked the 15th anniversary of the RCA, the Silver Jubilee of the Atomic Energy Authority and thirtieth anniversary of the IAEA. He emphasised that Sri Lanka has played an active role in RCA since its inception, and outlined some of the preparations that have been made to ensure a memorable meeting.

The Deputy Director General, and Head, Department of Technical Co-operation, Mr. Noramly bin Muslim welcomed all delegates to the Working Group Meeting on behalf of the Director General. He thanked the Government of Sri Lanka for agreeing to host the meeting and complimented Dr. Dharmawardena and his staff for the excellent arrangements. He pointed out that RCA is regarded by the Agency as a model for regional co-operation which other regions of the world might care to emulate. The full text is attached. (Annex 2).

In his address, the Minister for Industries and Scientific Affairs, the Honourable Denzil Fernando pointed out that modern science should be seen in the context of cultural and technological development which can be traced back over 2000 years in Sri Lanka. He invited delegates to take time from their scientific deliberations to enjoy some of the sights of his beautiful country.

The inaugural address was presented by the Chief Guest, Honourable A.C. Shahul Hameed. He expressed a warm welcome to all delegates on behalf of the Government of Sri Lanka. He pointed out that regional technical co-operation is not new to Sri Lanka. The Colombo Plan was born here 35 years ago and has fulfilled the aspirations of its authors. He saw the possibility of even wider co-operation between countries from the Red Sea to the Pacific Basin. The Minister requested that Sri Lanka's appreciation of the Agency's contribution to "peace, health and prosperity throughout the world" be conveyed to the Director General. The full text is attached. (Annex 3)

The UNDP Residence Representative, Mr. B.B. Thapa reiterated UNDP's support for IAEA and other Agency programmes. The vote of thanks was conveyed by the RCA Co-ordinator.

The IAEA appreciated the presence of the Honourable Raja Samaranayaka, Deputy Minister for Industries & Scientific Affairs, Mr. Justin Dias, Secretary to the Ministry and a number of distinguished guests from the diplomatic community, the public service and business.

3. INAUGURAL SESSION.

Following a brief address of welcome by Dr. Dharmawardena, the DDG-TC Mr. Noramly called for nominations of Chairman. Dr. Dharmawardena was nominated by India, supported by the Republic of Korea, seconded by China and accepted by acclamation.

The agenda (Annex 4) was accepted, following which a summary report of the year's activities (Annex 5) was presented by the RCA Co-ordinator. He highlighted the approval by UNDP of Phase II of the Regional Industrial Project, the contributions to the programme by the four donor countries, the decision by the Democratic People's Republic of Korea to participate in the Regional Industrial Project, the new projects and activities, and a number of administrative matters. He pointed out that the UNDP Industrial Project Document will be printed in May 1987, and requested that delegates examine whether their Governments could

sign by that date. Actions arising out of the 14th General Conference Meeting are summarized in Annex 5 Section 6.

4. FIRST TECHNICAL SESSION.

Review of the third extension of the RCA Agreement.

(a) Following extensive negotiations, the text of the third extension of the RCA Agreement was circulated to the Governments by the Director General on 9th February 1987 (Annex 6). The Following Member States offered comments on the text of the third extension of the RCA Agreement.

| | | |
|-----------|---|-------------|
| Australia | - | Annex 7 (a) |
| India | - | Annex 7 (b) |
| Japan | - | Annex 7 (c) |
| Korea | - | Annex 7 (d) |

Some of these comments relate to modifications to certain clauses of the text of the agreement. The RCA Co-ordinator informed delegates that the text of the third extension of RCA Agreement is based on the comments received by the Agency from Member States (up to February 1987) following the discussions on the draft Agreement held at the Meeting of the Representatives of RCA countries at Vienna, 2nd October 1986. The RCA Co-ordinator made the following comments on the points raised by the delegates.

(b) Article II Meeting of Representatives. The provision has been deliberately left broad so as not to restrict the authority of representatives to decide the pattern of their meetings. It is fully expected that the tradition of RCA built up over the past 15 years will ensure the continuation of the Working Group and the General Conference Meetings.

Article II (2) consensus: A provision for consensus was not explicitly included in the 9 February text. There is no provision for consensus or any form of voting in any IAEA Agreement.

Article VI, Project Committees. The role and function of the Project Committees are discussed in Section 7.1.2. The IAEA is unable to separately fund Project Committee Meetings.

Article VIII and X. Article VIII is designed to ensure that resources from non-traditional sources will only be accepted with the Authority of the Meeting of Representatives. The Agency is cognizant that the character of RCA could be changed if significant levels of such resources were accepted. Article X refers to promotional and related activities not involving the use of resources from non-traditional sources. (Article VIII).

(c) Australia, India, Japan and Korea who made on the record comments (Annexes 7 a, 7 b, 7 c, 7 d) asked that these be circulated with the Agreement. The RCA Co-ordinator undertook to discuss with the Agency's Legal Division the implementation of this request.

Following the discussion, the text of the third extension of the Agreement was accepted by all delegations.

5. SECOND TECHNICAL SESSION.

UNDP (RCA) Regional Industrial Project. A comprehensive report of Phase I activities was presented by the UNDP Project Co-ordinator. (Annex 8). He pointed out that the network of national co-ordinators were a key to the implementation of the regional project and stressed that different approaches were needed for countries and different levels of development.

The delegate from Japan commented on the low usage of the EB facility Jakarta. The Project Co-ordinator, in response, pointed out that there were logistical difficulties in importing significant quantities of plywood from other countries but added that the problem was recognized and was being addressed by upgrading the facility for pilot

plant operation and inviting local industrial participation. An Indonesian plywood company has expressed interest.

The delegate from China offered the use of facilities and Shanghai Applied Radiation Institute for radiation curing by both electron beam and ultra violet, as well as radiation cross-linking applications.

In response to a related question on the RVNRL project, the UNDP Project Co-ordinator and the Indonesian delegate announced that:

- (a) three trial shipments (20 kg, 5t and 1.5.t) had been shipped to Germany,
- (b) a full scale trial production run had been undertaken at the condom plant in Bangaran West Java, and that
- (c) plans for the production of surgical gloves were in preparation.

In addition, 3000 pairs of gloves for use in radioactive handling laboratories have been made in Japan.

The delegates from Pakistan and China supported the call for a Regional Conference on Phase I activities. In response to this and a number of similar suggestions the DDG-TC announced that he would make available funds from the reserve to facilitate such a conference. Member States in a position to host the conference were requested to contact the Agency.

The delegate from Pakistan suggested that experts supporting RCA Projects should be appointed for, periods of three months rather than for long-terms following advanced consultation with Member States. He also

requested an activity in Material Science. The RCA co-ordinator pointed out that there was provision for this in the project document and Pakistan would be consulted on details. He noted the comment from Thailand that the activity should be discussed at the next TPR.

The delegate from Malaysia announced that his country was prepared to accept the long-term expert in NDT.

In his concluding comments, the DDG remarked that the IAEA was very happy with RCA and saw it as a model for other regional arrangements in Africa and the Middle East. The DG takes an active interest in RCA and concurred with the appointment of long-term experts to complement those recruited for shorter-terms.

On other matters, he pointed out that the Agency currently invests \$11 M annually on training (including fellowships and scientific visits) but there were sometimes operational problems due to insufficient nominations and failure of selected candidates to appear. The DDG-TC also commented on the two year planning cycle. Concerning the IAEA 30th anniversary celebrations, the DDG announced that TC was preparing an exhibit for display in Vienna, Geneva and New York, and thanked delegates who had offered photographic material.

(6). THIRD TECHNICAL SESSION

Review of Food and Agriculture based projects:

6.1 Nuclear Techniques to improve domestic buffalo production (Annex 9)

The project was supported by Thailand, Bangladesh, Indonesia and Malaysia. The delegate from Korea enquired whether the techniques could be extended to domestic cattle.

6.1 Regional Project on Food irradiation - Phase II (Annex 10)

Delegates from Australia, Japan and China referred to problems of public acceptance. Japan urged the Agency to provide information on the toxicity of ethylene dibromide residues. The Deputy Director General agreed that the IAEA should support activities aimed at increasing public acceptance.

Delegates from Thailand, China, Bangladesh, Korea, Pakistan and India summarized progress towards the establishment of national pilot plant facilities. The delegate from Thailand expressed concern on lack of direct information his organization was receiving from the International Consultative Group on Food Irradiation. The Project is funded by Australia.

6.3: Isotope Hydrology and Sedimentology (Annex 11).

The RCA Co-ordinator announced that an Executive Management Seminar and a Regional Workshop will be held in the Beijing Institute of Uranium Geology, June 1987. (Annex 11)

The delegate of Sri Lanka foreshadowed a new project proposal. Korea recommended a two year extension with emphasis on environmental safety research in nuclear power plants. India sought information on laboratory inter-comparisons. The project is funded by Australia.

6.4: Semi-dwarf Mutants for Rice Improvement (Annex 12).

Korea asked that the project be extended 3-4 years. The delegate from China welcomed participants to Hangzhou for the final RCM. The Bangladesh delegate enquired whether the new varieties of rice and legumes could be transferred to his country for trial.

6.5: The use of Induced Mutations for improvement of grain legume production (Annex 13).

The delegates from Pakistan and India outlined progress in their countries. A new variety MOREA has been released in Indonesia. Pakistan offered the Nuclear Institute for Agriculture and Biology, Faisalabad as a regional centre for Agriculture and Biology. The Deputy Director General commented that the Agency would welcome the placement of fellows in the Region.

(7). FORTH TECHNICAL SESSION

Medical and Biological Applications of Nuclear Techniques:

7.1.1: Review of Agreement:

The delegate from Japan intimated that some domestic difficulties has arisen because only 6 of the RCA Governments signed the agreement. He pointed out that the following activities would fall within the scope of the agreement.

- a). Radiotherapy
- b). Nuclear Medicine
- c). Radiation and Allied Techniques in Biology
- d). Environmental Health Sciences (including radiation protection.)

Activities in the first three areas are being supported and others are planned for the fourth area. Japan noted a suggestion from Thailand that the project be renamed Medical and Health Related Biological Research.

7.1.2: Project Committee:

The functions of the project committee are set out in Article VI (3) of the Third Extension. The RCA Co-ordinator expressed the opinion,

that, to be fully effective, the Committee must have the responsibility of over-viewing the complete range of projects in each programme field. Only then could the Agency be appraised of the views of the Member States on the distribution of resources between one project and another. The following classification might be used:

- a). Medical and biological applications.
- b). Food and agriculture based projects.
- c). Nuclear science and technology

The Industrial Project, being UNDP funded, was subject to different assessment procedures. In particular UNDP required an independent Tripartite Review.

Since the Agency was unable to fund separate Project Committees Meetings, it was suggested that they should held with the authority of and in conjunction with the Working Group.

The Agency will produce a document on the administration of Project Committees for distribution to member States prior to discussion at the General Conference Meeting.

7.2: Review of Medical Projects:

7.2.1 Imaging Procedures for the Diagnosis of Liver Diseases: (Annex 14)

Japan expressed satisfaction with the progress of this project and proposed a further activity to be followed in this area. The production of the atlas of liver images was supported. Thailand noted that the forthcoming RCM had been rescheduled to October 1987, Bangkok. In response to a question from Sri Lanka, the RCA Co-ordinator explained that the proposed training course had been funded but its timing was subject to final negotiation. The Republic of Korea expressed support

for further activities in the area. The project is funded by Japan.

7.2.2: Improvement of Cancer Therapy (Annex 15):

Malaysia commented favourably on the Regional Training Course on Brachytherapy of Uterine Cancer, 6-26 October 1986, Kuala Lumpur. Japan agreed with Malaysia that it should be conducted biennially.

The delegate from Japan explained that the project had two aspects;

- a) The development of new techniques for cancer treatment;
- b) The spread of established procedures.

He was pleased with the progress of the latter, but observed difficulties with the former due to a number of factors including unavailability of chemicals and equipment.

The project is funded by Japan.

7.2.3: Workshop on Photon, Electron and Neutron Dosimetry (Annex 16)

The Workshop is funded by the Republic of Korea. Japan congratulated Korea on the Workshop. A number of countries, including India, Pakistan and Indonesia have announced that they will be nominating participants.

7.2.4: Nuclear Techniques for the Diagnosis of Tropical Parasitic Diseases (Annex 17).

A number of countries expressed support. Thailand requested feed-back on the performance of the monoclonal antibodies (malaria) supplied from Bangkok.

7.2.5: Radioaerosol Inhalation Imaging. (Annex 18).

The project is supported by India and the regular budget.

The Indian delegate announced that BARC would supply 10-12 aerosol units and demonstrate the operation at a CRM later in the year. China and Thailand amongst other countries expressed support.

7.2.6. Technetium 99m generator systems. (Annex 19)

The delegate from Japan enquired why the Hungarian sublimation generator been distributed for evaluation. The RCA Co-ordinator explained that is planned to invite the Australian and Indian gel generator systems for inclusion in the intercomparison. However the "sublitech" system was ready for evaluation when some wind-fall funding enabled the issue of a technical contract.

7.2.7. Radiation Sterilization of Biological Tissue Grafts (Annex 20).

The RCA Co-ordinator explained that this project will provide a scientific basis for the establishment of tissue banking within the region with the support of TC. Support for the development of tissue banking facilities was expressed by Sri Lanka, India, China, Bangladesh, Indonesia, Republic of Korea and Pakistan. The Thai delegate suggested that activities should be organized through the Red Cross. The Japanese delegate enquired whether WHO was involved.

7.2.8 Radioimmunoassay of Thyroid Related Homones (Annex 21)

Virtually every country expressed enthusiastic support for the project. The only complaint was that not all RIA laboratories could be covered. Pakistan inquired why Netria was the sole source of bulk reagents. The delegate from the Republic of Korea noted the inclusion of

to non- RCA countries, Burma and Democratic People's Republic of Korea, in the project. The RCA Co-ordinator explained that the activity was funded as a TC regional project and hence any IAEA Member State within the Asian and Pacific Region could join.

The DDG announced that the European Economic Community will support a similar project in Latin America at level of \$350,000.

7.2.9. Toxic Elements in foodstuffs (Annex 22)

The extensive work in India in this field was outlined. China expressed interest in hosting some activities in this project.

8. FIFTH TECHNICAL SESSION.

Nuclear technology based projects.

8.1 Basic Science using research reactors. (Annex 23)

(a) Workshop on the Operation and Maintenance of Research Reactors. (16 Nov. - 4 Dec. 1987)

(b) Workshop IBM compatible PC's for laboratory automation. (23 Nov. -11 Dec. 1987)

Both workshops will be held at BARC and funded by India.

A number of countries expressed support. Pakistan would like to see RCA activities concerned with the use of research reactors for neutron beam experiments.

8.2 Nuclear instrument maintenance (Annex 24)

Appreciation for this project was expressed by Sri Lanka, Korea, Thailand, and Bangladesh. Korea raised the important issue of the supply of spare parts for maintenance. The question is being actively considered by the Agency.

8.3 WASP Users Workshop

The delegate from Japan asked whether other equivalent computer programmes were available. The delegate from Thailand explained that WASP had the advantage that it was widely available within the region and that the IAEA provided extensive training. The RCA Co-ordinator added that it is now available in a PC version. In response to Korea, the RCA Co-ordinator explained that the activity was being funded through the Director's reserve.

Indonesia has agreed to hold the first workshop, and Malaysia has offered to host the second.

(9). SIXTH TECHNICAL SESSION

Country Statements.

The following country statements were presented.

| | | |
|----------------------|---|----------|
| Australia | - | Annex 25 |
| Bangladesh | - | Annex 26 |
| China | - | Annex 27 |
| India | - | Annex 28 |
| Indonesia | - | Annex 29 |
| Japan | - | Annex 30 |
| Republic of Korea | - | Annex 31 |

| | | |
|-----------|---|----------|
| Malaysia | - | Annex 32 |
| Pakistan | - | Annex 33 |
| Sri Lanka | - | Annex 34 |
| Thailand | - | Annex 35 |

(10) SEVENTH TECHNICAL SESSION

10.1: Input of member States to the RCA Programme.

Co-ordinated Research Programmes

Thailand, Malaysia, Republic of Korea and Sri Lanka raised some questions concerned with the administration of research contracts. Local issues differed, but basically they were concerned with the fact that the IAEA can offer research contracts to researchers without Government clearance. Assessment of the project in the context of national priorities is therefore not possible.

In response it was pointed out that one of aims of the Agency's research contracts is to promote and develop nuclear science applications perceived by Agency experts to be of potential benefit to Member States. A practice has developed within the Department of Research and Isotopes of offering a small number of such contracts directly. Sri Lanka requested that all incoming information be copied to the local Atomic Energy Commissions.

Communication

A second issue of concern is that of communication. Long lines of communication can lead to unacceptable delays. The Agency is endeavouring to overcome this problem by copying correspondence directly to the appropriate institute. The delegate from Sri Lanka raised a problem concerning the importation of radioactive materials through UNDP.

10.2: New Project Proposals

10.2.1: Energy and nuclear power planning within the Asian and Pacific Region (Annex 36).

The project which has been submitted for TC funding has been well received.

10.2.2 Regional Development of Radiation Sterilization Practices for Tissue Grafts and Tissue Banking (Annex 37).

Support for the project was expressed by Korea, Bangladesh, India, Sri Lanka, Thailand and Pakistan. Japan could help with the radiation technology aspects and could provide some 'internal' support. India has offered to supply radiation equipment provided a satisfactory financial arrangement with the Agency can be negotiated.

10.2.3: Improvement of radiotherapy for advanced Carcinoma of the Cervix in Asian countries through the application of a computer planning system (Annex 38).

Japan generally supports the project but believes indicative budget is too high. Support was also expressed by Thailand, Malaysia and Pakistan.

10.2.4: Development of a radiation protection infrastructure

Realizing the very success of RCA projects will lead to an increased use of radioisotopes and radiation sources, Japan supports the project in principle. The project is also very relevant to countries with research and power reactors.

To enable the development of a relevant well defined programme, a project formulation meeting will be called. The delegate from Australia pointed out that the World Congress of the International Radiation Protection Association is meeting in Sydney, 11-15 April 1988.

Nov.
mtg.
Tokyo

The DDG supported the project because of its relevance to all RCA Member States. Specific support was voiced by Thailand, India, Korea, Malaysia and Sri Lanka.

10.2.5. Use of Computers in Technetium - 99m Imaging.

As recorded in the country statement, consideration is being given in Australia to supporting the above project.

10.2.6 Monoclonal Antibodies for Immuno Scintigraphy (Annex 39)

The delegates from Japan undertook to enquire whether his country could supply the In-111. He added that the technique is not routinely available in his institute. Support was expressed by China, Pakistan, Thailand and Sri Lanka. Korea and Bangladesh will assess the project further.

10.2.7. Integrated Control of Tropical Plant Viruses with Nuclear Techniques (Annex 40)

India would prefer to see the project focussed on one or two viruses and suggested legume viruses. Support for the project was expressed by Korea, Indonesia and Pakistan.

10.2.8 The Development of More Effective Soil Management Practices by Quantitative Assessment of Soil Erosion and Sedimentation. (Annex 41).

This Sri Lankan proposal involves systematic measurements of environmental Caesium-137. Support was expressed by Thailand, Korea, Bangladesh, Indonesia and Malaysia. Australia would consider 'in kind' support.

10.2.9 Regional Training Course on the Use of Isotopes in Soil Plant Studies with Special Emphasis on Tree Crops (Annex 42).

Specific support was expressed by Japan and Thailand. The Agency undertook to distribute the background report on this activity.

10.2.10 The Use of Isotope Techniques to Study the Fate and Significance of Pesticides in Biological Systems and in the Environment.

The Agency was requested to report the various avenues open to RCA Member States for support in this field.

10.2.11. Archeological Investigations of Interest to the Region.

This proposal was introduced by India whose delegate pointed out that project would involve the application of a range of techniques including XRF PIXE/PIGME, TL magnetic measurements etc.

Interest was expressed by Sri Lanka and China. Thailand sought more information through an expert mission and scientific visits. Australia is experienced in the applications of these techniques to archeology.

10.2.12 International Laboratory for Marine Radioactivity (Monaco) (Annex 43).

A number of countries, including Thailand expressed interest in learning of the specific capabilities of the laboratory through perhaps an expert mission.

10.2.13. Concluding comments - DDG-TC

The RCA budget and budget estimates are attached as Annex 44. In proposing projects, Mr. Noramly reminded Member States that they must bear in mind the policies and guidelines development by the Agency. These include:

- (a) Projects must have an essential nuclear component.
- (b) They must involve application of a proven technology.
- (c) There must not be a proliferation of small projects.
- (d) The equipment component must not be too high.
- (e) The projects must be designed to respond to ~~x~~ specific human needs.
- (f) Duplication of projects, particularly within UN Agencies must be avoided.

The full text of his speech is presented as Annex 45.

A N N E X 1

| <u>COUNTRY</u> | <u>NAMES OF DELEGATES</u> | <u>HEAD OF THE DELEGATION</u> |
|----------------|--|-------------------------------|
| 1. AUSTRALIA | DR. DAVID G. WALKER COMMISSIONER AND CHIEF EXECUTIVE OFFICER AUSTRALIAN ATOMIC ENERGY COMMISSION: MR. S.A. KENTWELL NUCLEAR AFFAIRS SECTION DEPARTMENT OF FOREIGN AFFAIRS | DR. DAVID G. WALKER " |
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NINTH RCA WORKING GROUP MEETING

COLOMBO, SRI LANKA, 23-26 MARCH 1987

Opening Remarks

by Noramly bin Muslim, Deputy Director General
Head of the Department of Technical Co-operation
International Atomic Energy Agency

Your Excellency, Minister of Foreign Affairs, Honorable Shahul Hameed, Your Excellency, Minister of Industries and Scientific Affairs, The Honorable Denzil Fernando, Mr. Chairman, Sri Lanka Atomic Energy Authority, Dr. Dharmawardena, 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 Ninth Working Group Meeting of RCA Member States.

I would like to express sincere appreciation to the Government of Sri Lanka for agreeing to host the meeting and to compliment Dr. Dharmawardena and his staff of the Atomic Energy Authority and the Radioisotope Centre for the excellent arrangements which befit the 15th Anniversary of RCA, and the 25th Anniversary of Sri Lanka Atomic Energy Authority. This includes the mini exhibition on the benefits of peaceful uses of atomic energy in Sri Lanka and Member States. There has long been a willingness within the Region to co-operate in the applications of nuclear science and technology. I have recently been reminded by Dr. Ramana that regional co-operation can be traced back beyond the acceptance of the first RCA Agreement to the India - Philippines - Agency project which ultimately involved a number of Asian and Pacific countries. Despite very different educational and cultural systems it was found possible to train personnel so that scientists were available to initiate various Research and Development projects in their respective countries. In addition, it was demonstrated that sophisticated apparatus such as a filter detector spectrometer could be built with the means and expertise of regional centres when co-operation was present.

Over the past 15 years the scope of activities has considerably expanded and RCA countries have benefitted through many examples of co-operation in the applications of nuclear techniques to medicine, agriculture, industry and basic science. Indeed the lessons and experiences drawn from our agreement provide a basis for similar regional arrangements in Latin America and future plans for co-operation between Member States in Africa. The Agency is aware of potential advantages of establishing a dialogue with other governmental bodies dedicated to regional development.

During this Working Group Meeting, we will be discussing the Third Extension of the RCA Agreement. Although the current agreement has generally served Member States well, some operational difficulties have been experienced which led the Agency to agree to an extensive redrafting. Work on the revision started last summer. The views of RCA Member States were extensively canvassed and, as far as possible, included in the final version, circulated by the Director General on 9th February. I would remind all delegates that it is essential that the Agreement enter into force on 12 June 1987.

It is a pleasure for me to record a number of highlights over the past year. First of all, UNDP approved Phase II of the Regional Industrial Project at a level of US\$ 3 Million over the fourth programming cycle 1987 to 1991. In addition generous extra-budgetary support was foreshadowed by Australia and Japan. The IAEA is also grateful to Indonesia for continuing to host the Regional Office and to all participating Governments for essential "in kind" support. An official request has been received from the Democratic People's Republic of Korea to join the Project. Interest in a number of other RCA projects, has also been expressed.

Technically one of the highlights of the year was the opening by the President of Indonesia Dr. Suharto, of the Pharmaceutical manufacturing plant jointly owned by the Government and PN KIMIA FARMA, Bandung. Of the three operational production lines, one contained project irradiated latex. This is a significant milestone for RCA as it represents a trial production run at a commercial scale of our regional co-operation effort.

All RCA activities have made good progress. Special mention should be made of the Regional Workshop on "Photon, electron and neutron dosimetry for radio therapists" to be funded by the Republic of Korea and of the two Workshops in Bhabha Atomic Research Centre to be funded through the extra budgetary contribution from India. This support from developing countries within the Region is an eloquent testimony of the spirit of RCA. The Agency also gratefully acknowledges continuing contributions from Australia and Japan. The Australian Government will continue to support the Regional Project on Food Irradiation (Phase II) through 1987. The project can take significant credit for the decision to establish large-scale food irradiation facilities in Bangladesh, Thailand, Pakistan and the Republic of Korea. Australia is also funding a Regional Isotope Hydrology Workshop in China.

Japan is providing major funding for medical projects with special emphasis on cancer treatment and the diagnosis of liver diseases. A successful Regional Training Course was held in Kuala Lumpur last year in October using Japanese supplied intracavitary radiation therapy equipment. The liver project will be completed with the publication of a reference atlas of liver images which, it is believed will serve the physicians of the region for many years.

In the field of agriculture it is pleasing to report the introduction into Asia of a number of varieties of grain legumes and semi-dwarf rice derived from induced mutations.

Another successful project is related to the Radioimmunoassay of Thyroid Related Hormones. In Asia there are an estimated 400 million people suffering from disorders relating to iodine deficiencies. The aim of the project is to stimulate self-sufficiency in the technology through the manufacture of reagents and the development of analytical and quality assurance procedures.

As you are aware, one of our aims is to increase the recruitment of regional experts for regional missions in the belief that to be truly effective an expert must not only be technically competent but also have a sympathy and understanding of the problems of the country in which he is serving. The non-destructive testing sub-project provides a good example of what we have in mind. The stage has been reached where requirements for experts could virtually all be met within the Region. Although heavily dependent on Australia, India and Japan, experts have also been identified in the Philippines, Korea, Singapore and Pakistan. China has also expressed a willingness to share its expertise. Of course appropriate international recruitment will continue to ensure that the Region benefits from exposure to world-wide technology.

Excluding "in kind" contributions from Member States, the total consolidated budget for 1986 RCA activities was \$1.88 million of which \$1.05 or 56 percent was invested in the Regional Industrial Project. Of the consolidated budget, \$1.31 million or 70 percent was derived from UNDP and donor countries. The Agency recognises that the high proportion of extra-budgetary support makes RCA a very special agreement.

To conclude I would 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 maximum benefit is accruing to Member States from resources allocated to RCA activities.

Inaugural Address

by

Hon. A. C. Shahul Hameed

Minister of Foreign Affairs of Sri Lanka

at the

SILVER JUBILEE OF SRI LANKA'S ATOMIC ENERGY PROGRAMME

15TH ANNIVERSARY OF REGIONAL NUCLEAR CO-OPERATION
30TH ANNIVERSARY OF INTERNATIONAL ATOMIC ENERGY AGENCY

AND

NINTH WORKING GROUP MEETING OF THE
IAEA REGIONAL CO-OPERATIVE AGREEMENT AMONG THE
ASIAN AND THE PACIFIC COUNTRIES

23rd March 1987

Colombo, Sri Lanka

among developing countries. Technical cooperation is not new to Sri Lanka. The Colombo Plan was born here 35 years ago and has fulfilled the aspirations of its authors.

This meeting coincides with the Silver Jubilee of Sri Lanka's Atomic Energy programme. I wish to congratulate the Honourable Minister of Industries and Scientific Affairs and the Chairman of the Atomic Energy Authority of Sri Lanka on this occasion.

In our opinion, TCDC is an important component of international cooperation in alleviating poverty and stimulating the development process in developing countries. However, this does not detract from the importance of North-South cooperation in the field of peaceful use of nuclear energy. The North has achieved a high level of industrialisation and scientific development, particularly in the nuclear energy sector. The North-South cooperation is no longer a moral obligation but an imperative of mutual benefit. If interpreted otherwise, the forces of global interdependence will take a dangerous course leading us towards the abyss of economic chaos and social upheavals irrespective of prevailing political and economic barriers. Technical Cooperation in the field of nuclear energy, in this context, is an essential element that could stimulate and augment development process in the South. The Regional Cooperative Agreement of Asia and Pacific, the achievements of which we celebrate today, is one such commendable effort.

Ravages of the Second World War enlightened us about the need for a peaceful future. Those hopes found expression in varying degrees in the United Nations and its organs – a desire to share wealth, economic benefits, health, education, technology. That Idealism underpins the IAEA as well. The Agency was founded "to accelerate and enlarge the contribution of atomic energy to peace, health

and prosperity, throughout the world". In this 30th Anniversary Year of the IAEA, we wish to congratulate the IAEA on their achievements. I am sorry my one time colleague Dr. Blix is not here but I am sure his able Deputy would do me the favour of informing him how appreciative we are of his contribution.

I wish to compliment the Deputy Director General, the RCA Coordinator of the IAEA and the representatives of the 14 Member States on the progress they have made. Their efforts have contributed towards the development process in our region.

The question of resources provision for international co-operation and for the functioning of multilateral institutions has, since of late, been a subject for much controversy and debate. In our view the transfer of resources and economic co-operation whether between North and South or among developing countries is not an act of obligation. It is a sheer necessity dictated by realism and developments in our environment. It is also—perhaps more importantly—a manifestation of the desire to live in a climate of peace and prosperity. It is this desire and man's natural yearn to live in peace that should guide our decisions and morals in this era of "the Atom." In this context, the international community must take decisive steps to deviate from policies that use "Atoms for destruction" to "Atoms for Development." The resources if released—which as we all know are substantial—could well be used for necessary research and development of appropriate technologies that could be cost effective and within the means of developing countries. Such an approach will, no doubt, ease tension in the sphere of global security, thus rupturing the vicious circle of resource mobilization for destructive purposes on account of perceived threats. Can we achieve such a goal? One's imagination is blurred by the ever changing international

scene to venture a realistic reply. Of course, we cannot be defeatists. The call and clamour must go on. Otherwise there is no future for our planet.

Sri Lanka participated in the Special Session of IAEA on Nuclear Safety which adopted the two conventions on early notification of nuclear accidents and on assistance in case of a nuclear accident. It is also important to bear in mind the need to address the question of other possible scenarios which were left out of deliberations at that session. For example, a premeditated attack on a nuclear facility can produce adverse radioactive effects in the region. Many developing countries with nascent nuclear power programmes may harbour legitimate fears of such situations as a result of hostilities or even as an act of terrorism.

Certain unforeseen developments in the recent past have drawn the world's attention to the need for international co-operation to reduce the risk of recurrence of such mishaps. Nuclear power, as any other hi-tech manufacture cannot be infallible and immune to accidents. Therefore, this draws our attention to the need to maximise safety for the development of nuclear power and its allied applications for peaceful uses. This calls for broader regional and international co-operation with special emphasis on such areas as infrastructure, man-power training, research and development and technical and scientific information.

We expect the IAEA to continue to play its role in this field—a role it has performed with distinction. Today in Geneva the UN Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy will commence its deliberations. This Conference is of singular importance to us. This Conference is expected to address exclusively the question of promoting international co-operation in the peaceful uses of nuclear

energy for economic and social development. The Conference was mandated by the UN General Assembly recommendation of 1977. It is our hope that this Conference will now explore not only the avenues of technical co-operation and availability of resources for such co-operation but also the safe development of nuclear energy through close international and regional co-operation. Such an approach would help to strengthen public confidence in the use of nuclear energy for peaceful purposes. We await a positive outcome from this Conference. Not only the people who have the nuclear power must be saved but also those who do not have it. Those who have are prepared for accidents. Thus dangers are perhaps more to those who neither have nuclear power nor enjoy its benefits.

Since this meeting is primarily a regional forum to discuss programmes pertaining to Asia and the Pacific, attention should be focused on the need to expand activities in the region. This is specially so in the light of the requirements we face vis-a-vis nuclear safety. We are aware that the European Community established the European Atomic Energy Community (Euratom) in 1957 to ensure, among other things, that the peaceful uses of nuclear energy have no adverse effects on man or environment. Since then they have incessantly striven to achieve those objectives. It is surprising that even after thirty years we have not been able to take any such concerted initiative in our region.

About two months ago I addressed a Conference of Asia and Pacific Administrators. In my speech I spoke of a rainbow rising in the Red Sea spanning the Asian horizon and dipping into the blue waters of Pacific Ocean. In this context, I referred to the GCC, the Gulf Council for Co-operation; SAARC, South Asian Association for Regional Co-operation; ASEAN, Association of South East Asian Nations and the South Pacific Forum developing into

the Pacific Basin Development Authority, including South Korea and Japan. Therefore, we have the framework for greater co-operation.

I also referred to trans-regionalism at that meeting. Asia and the Pacific have many factors in common. This rainbow is not only beautiful but also powerful. The scientists of Asia and the Pacific can weld us together. If the peoples in these two regions could reach out to a better tomorrow, a greater part of the problem world faces today could be reduced since more than two-thirds of the human race live in these two regions. That is a challenge we politicians, economists, scientists and planners face.

I have no doubt that your meeting will make its contribution to throw light on some of the practical ways in which we can face up to this challenge. I wish your deliberations success.

NINTH RCA WORKING GROUP MEETING
COLOMBO, SRI LANKA, 23-26 MARCH 1987

Monday 23 March

9.00 am.

- (a) Welcoming Remarks by representative of Host organization
- (b) Election of chairman and comments by chairman elect
- (c) Adoption of Agenda
- (d) Summary report of the 15th Meeting of Representatives of RCA Member States

FIRST TECHNICAL SESSION

Review of the third extension of the RCA Agreement

SECOND TECHNICAL SESSION

UNDP (RCA) Regional Industrial Project

THIRD TECHNICAL SESSION

Review of food and agriculture based projects

- i) Nuclear techniques to improve domestic buffalo production
- ii) Regional project for food irradiation -Phase II
- iii) Hydrology and Sedimentology
- iv) Semi-dwarf mutants for rice improvement
- v) Use of induced mutuation for improvement of grain legume production

5.45 pm.

INAUGURAL SESSION

- (a) Remarks by Deputy Director General, Technical Co-operation, IAEA, Noramly bin Muslim
- (b) Remarks by Chairman of Sri Lanka Atomic Energy Agency, Dr. Dharmawardena
- (c) Welcoming remarks by the Minister of Industries and Scientific Affairs, The Hon. Denzil Fernando
- (d) Inaugural Speech by the Minister of Foreign Affairs, Hon. A.C. Shahul Hameed

Tuesday 24 March

FOURTH TECHNICAL SESSION

Medical and biological applications of nuclear techniques

- i) Review of Agreement;
- ii) Project Committee, Membership and administration.

Review of Medical Projects

- i) Imaging procedures for the diagnosis of liver diseases;
- ii) Improvement of cancer therapy;
- iii) Regional Workshop "Photon, electron and neutron dosimetry for radiotherapists";
- iv) Nuclear techniques for the diagnosis of tropical parasitic diseases;
- v) Radioaerosol inhalation imaging for the diagnosis of respiratory diseases;
- vi) Technetium -99m generator systems;
- vii) Radiation sterilization of biological tissue grafts;
- viii) Radioimmunoassay
- ix) Nuclear techniques for toxic elements in foodstuffs

FIFTH TECHNICAL SESSION

Nuclear Technology Based Projects.

- i) Basic Science Using Research Reactors
 - Workshop on Operation and Maintenance of Research Reactors
 - Workshop on PC's for Laboratory Automation
- ii) Maintenance of Nuclear Instruments
- iii) WASP Users Workshop

SIXTH TECHNICAL SESSION

Country Statements

SEVENTH TECHNICAL SESSION

Future Direction of RCA

- i) Input of Member States to the RCA Programme
- ii) New Project Proposals

Wednesday 25 March

Field Excursion to Sigiriya and Dambula

Thursday 26 March

EIGHTH TECHNICAL SESSION

- i) Review of the third extension of the RCA Agreement
(second discussion);
- ii) RCA Action Plan for 1987 and cost projections for 1988;
- iii) Presentation and acceptance of meeting report;
- iv) Other business

CLOSING SESSION

- i) Closing remarks by IAEA
- ii) Official closing

Friday 27 March

Visit to Kandy and Peradeniya

Report of the RCA Co-ordinator

Before commencing my report, I would like to congratulate Dr. Dharmawardena on his election as chairman of this Working Group Meeting and his staff for the excellent arrangements they have made. It has been a pleasure working with them. It is pleasing to be able to report a number of significant achievements over the past year.

Regional Industrial Project. The UNDP Action Committee for Projects approved Phase II, RAS/86/073 at its meeting on 25 February 1987. The document was signed by UNDP on 9 March 1987 indicating support at a \$3M level over the fourth programming cycle 1987-91. The IAEA and seven Member States have also signed the document. Generous extra-budgetary support has again been announced by Japan and Australia. It is planned to submit the Project Document for printing on 1st May, the date of the official commencement of the Second Phase. For the sake of appearance, the remaining Member States may review whether they could sign by that date. The willingness of UNDP to continue support for a further five years is a tribute to those who conceived the project and worked to ensure a successful Phase I.

As mentioned in Mr. Noramly's speech, 70 per cent of the funding to the RCA programme was derived from extra-budgetary sources in 1986. The Republic of Korea has joined India as the second developing Member State supporting RCA projects as a donor. Japan has announced a substantially increased contribution and Australia is maintaining its traditional role as a major donor. Details are provided in the background paper on budgets and budget estimates.

Third Extension of the RCA Agreement. There is little I wish to say at this stage to what Mr. Noramly has already stated. Briefing notes have been included for your information. The Secretariat believes that, following extensive consultation an agreement has been drafted which is both workable and comprehensive.

Participation in RCA projects. At the invitation of the Democratic People's Republic of Korea, the UNDP Project Co-ordinator and I visited Pyongyang in July 1986. The purpose of the visit was to appraise officials of the Academy of Sciences on the Regional Industrial Project. A request to join the Project was subsequently forwarded to the Agency through the local UNDP Resident Representative. On the basis of the precedent established two years ago by China, the Agency welcomed this development and forwarded a Project Document for signature.

The Democratic People's Republic of Korea also separately expressed interest in four RCA Projects. No response has yet been made to this initiative for two reasons:

- i) the existing RCA Agreement is about to expire; and
- ii) it was felt that, in the spirit of RCA, the Working group Meeting should first be informed.

New projects: A number of new activities have been included in the 1986-87 Action Plan:

- i) Co-ordinated Research Programme: Aerosol inhalation imaging for the diagnosis of respiratory diseases in developing countries, jointly funded by the IAEA and India.

- ii) Energy and Nuclear Planning within the Asia and Pacific Region. A regional workshop will be held in Indonesia in December. A request for a Regional Project with TC funding has been submitted.

- iii) Radioimmunoassay of thyroid hormones. This Project was introduced at the 7th Working Group Meeting, Lahore 1985, and is being implemented with TC funding.

- iv) Regional Workshops. Four Regional Workshops funded with extra-budgetary contributions will be held this year.

At least eight new projects will be considered for inclusion within the programme during the course of our deliberations.

Specific matters arising out of the Fifteenth General Conference Meeting.

i) RCA Action Plan. A 1986/87 Action Plan has been prepared and included in the background documents.

ii) Presentation of an RCA contribution to the PUNE Conference. Administratively, separate presentation was found not to be possible. A section on RCA was included in the Agency's paper.

iii) RCA Seminar. The deadline for submissions is 8th May. Comments on the nature and scope of the Seminar would be welcomed.

iv) RCA Steering Committee. In order to ensure effective formal communication between the Departments of Technical Co-operation and Research and isotopes. The meeting was convened involving the Director and the Deputy Director of the Joint Division of Life Sciences, the Head of the Medical Applications Section and the RCA Co-ordinator. The Background Document was reviewed. Particular attention was paid to new project proposals. The meeting will be convened as required, but at least every six months.

v) An RCA Commemorative Booklet is being prepared. An article on Regional Technical Co-operation describing RCA and ARCAL activities will appear in the forthcoming IAEA Bulletin which is devoted to Technical Co-operation. A paper has been offered to the Pacific Basin Conference Beijing.

Finally, Mr. Chairman, I would like to thank those of you who have brought photographic material illustrating TC activities. This is currently being used in a display prepared by the Atomic Energy Authority

and to which many schools have been invited. It would be a nice gesture to the children of Sri Lanka if some of us could find time during the lunch break or at other appropriate opportunities to visit the exhibit and assist the staff explain some of the many applications of nuclear techniques.



INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA

WAGRAMERSTRASSE 5, P.O. BOX 100, A-1400 VIENNA, AUSTRIA. TELEX: 1-12645. CABLE: INATOM VIENNA. TELEPHONE: 2360 EXT.

IN REPLY PLEASE REFER TO
PRIERE DE RAPPELER LA REFERENCE:

B2.01 Circ.

9 February 1987

Sir,

I have the honour to refer to the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology of 1972 (the RCA), as extended first in 1977 and subsequently in 1982, each time for a five-year duration. The texts of the RCA and of the First and Second Extension Agreements are set forth in documents INFCIRC/167 and INFCIRC/167/Add.8 and Add.11, respectively.

Pursuant to the RCA Second Extension Agreement of 1982, the current five-year duration is due to expire on 11 June 1987. At the Fifteenth Meeting of the Governments Parties to the RCA, held in Vienna on 2 October 1986, it was agreed that the RCA be further extended for another five-year period. This was to be achieved by means of a revised agreement which would retain the flexibility of the RCA, its basic objectives and broad scope, while some adjustments would be made to reflect the experience gained from, and to enhance the overall co-ordination and supervision of, co-operative projects and research co-ordination activities carried out under RCA arrangements.

In the light of the foregoing and having regard to the informality and flexibility of such arrangements, the Fifteenth Meeting of the RCA Governments made some suggestions to a draft revision prepared by the Secretariat in August 1986, and broadly endorsed it. Subsequently, up to the end of January 1987, the Secretariat has further received from several Governments additional comments on that draft revision. All comments and suggestions, as far as possible and to the extent compatible with each other within the purview of this revision, have been taken into account by the Secretariat in establishing the final text of the RCA for its third extension in 1987.

I have now the honour to forward herewith, for consideration and acceptance by your Government, the text of the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology of 1987 as resulting from the revision process outlined above.

Since the RCA has continued to prove its usefulness in providing a flexible framework and a valuable mechanism for increased and co-ordinated co-operation among Member States in the Asian region in peaceful applications of nuclear energy, it is to be hoped that your Government will favourably consider accepting this revised RCA at its earliest convenience. Should your Government so decide, it would be highly desirable that its notification to that effect reach me ahead of the expiration date of the existing RCA, that is before 11 June 1987 at the latest.

Accept, Sir, the assurances of my highest consideration.

A handwritten signature in black ink, appearing to read 'Hans Blix', with a stylized flourish at the end.

Hans Blix
Director General

Enclosure

REGIONAL CO-OPERATIVE AGREEMENT FOR RESEARCH, DEVELOPMENT AND TRAINING
RELATED TO NUCLEAR SCIENCE AND TECHNOLOGY, 1987

WHEREAS it is a function of the International Atomic Energy Agency (hereinafter referred to as the "Agency") to encourage and assist research on, and the development and practical application of, atomic energy for peaceful uses, which function can be fulfilled by furthering co-operation among its Member States and by assisting them in their national atomic energy programmes;

WHEREAS the Governments Parties to this Agreement (hereinafter referred to as the "Governments Parties") recognize that, within their national atomic energy programmes, there exist areas of common interest wherein mutual co-operation can promote the more efficient utilization of available resources; and

WHEREAS, under the auspices of the Agency, the Governments Parties desire to enter into a Regional Agreement to encourage such co-operative activities;

NOW, THEREFORE, it is agreed as follows:

ARTICLE 1

The Governments Parties undertake, in co-operation with each other and the Agency, to promote and co-ordinate co-operative research, development and training projects in nuclear science and technology through their appropriate national institutions.

ARTICLE II

1. There shall be a meeting of representatives of the Governments Parties (hereinafter referred to as the "Meeting of Representatives") to be convened by the Agency. The Meeting of Representatives shall be held as required and, at least, once every year. Each representative may be accompanied by alternates, experts and advisers.

2. The Meeting of Representatives shall have the authority:

- (a) to determine a programme of activities and to establish priorities therefor;
- (b) to consider and approve the co-operative projects proposed in accordance with paragraph 1 of article III;
- (c) to review the implementation of the co-operative projects established in accordance with paragraph 2 of article III;
- (d) to co-ordinate the activities of the project committees established in accordance with article VI;
- (e) to consider the annual report submitted by the Agency pursuant to paragraph 4 of article VII; and
- (f) to consider any other matters related to or connected with the promotion and co-ordination of co-operative projects for the purposes of this Agreement as set forth in article I.

ARTICLE III

1. Any Government Party may submit a written proposal for a co-operative project to the Agency, which shall, upon receipt thereof, notify the other Governments Parties of such proposal. The proposal shall specify, in particular, the nature and objectives of the proposed co-operative project and the means of implementing it. At the request of a Government Party, the Agency may assist in the preparation of a proposal for a co-operative project.

2. In approving a co-operative project pursuant to paragraph 2(b) of article II, the Meeting of Representatives shall specify:

- (a) the nature and objectives of the co-operative project;
- (b) the related programme of research, development and training;
- (c) the means of implementing the co-operative project and verifying the achievement of project objectives; and
- (d) other relevant details as deemed appropriate.

ARTICLE IV

1. Any Government Party may participate in a co-operative project established in accordance with article III, by means of a notification of participation to the Agency, which shall notify the other Governments Parties of such participation.
2. Subject to paragraph 2 of article VII, the implementation of each co-operative project established in accordance with article III may start after receipt by the Agency of the third notification of participation in the co-operative project.

ARTICLE V

1. Each Government participating in a co-operative project in accordance with article IV (hereinafter referred to as "Participating Government") shall implement the portion of the co-operative project assigned to it in accordance with paragraph 3(b) of article VI. In particular, each Participating Government, subject to its domestic laws and regulations, shall:
 - (i) make available the necessary scientific and technical facilities and personnel for the implementation of the co-operative project; and
 - (ii) take all reasonable and appropriate steps for the acceptance of scientists, engineers or technical experts designated by the other Participating Governments or by the Agency to work at designated installations, and for the assignment of scientists, engineers or

technical experts to work at installations designated by the other Participating Governments for the purpose of implementing the co-operative project.

2. Each Participating Government shall submit to the Agency an annual report on the implementation of the portion of the co-operative project assigned to it, including any information it deems appropriate for the purposes of this Agreement.

3. Each Participating Government, subject to its domestic laws and regulations and in accordance with its respective budgetary appropriations, shall contribute, financially or otherwise, to the effective implementation of the co-operative project and shall notify annually the Agency of any such contribution.

ARTICLE VI

1. There shall be established a project committee for each co-operative project.

2. The project committee shall consist of one representative from each Participating Government and one representative from the Agency. They may be accompanied by advisers.

3. The functions of the project committee shall be:

- (a) to determine details for the implementation of each co-operative project in accordance with its objectives;
- (b) to establish and amend, as necessary, the portion of the co-operative project to be assigned to each Participating Government, subject to the consent of that Government;
- (c) to supervise the implementation of the co-operative project; and

- (d) to make recommendations to the Participating Governments and to the Agency with respect to the co-operative project, and to keep under review the implementation of such recommendations.

5. The project committee shall meet as required and, at least, once every year.

ARTICLE VII

1. The Agency shall perform secretariat duties under this Agreement.

2. Subject to available resources, the Agency shall endeavour to support co-operative projects established in accordance with article III by means of technical assistance and its other programmes. Any such assistance shall be provided, *mutatis mutandis*, in accordance with the principles, rules and procedures governing the provision of technical assistance by the Agency.

3. On the basis of recommendations made by the project committee for a co-operative project pursuant to paragraph 3(d) of article VI and in consultation with the project committee, the Agency shall:

- (a) establish annually a schedule of work and modalities for the implementation of the co-operative project;
- (b) allocate among the Participating Governments the contributions made in accordance with paragraph 3 of article V and paragraph 1 of article VIII;
- (c) consider the annual reports submitted by the Participating Governments on the implementation of their portions of the co-operative project pursuant to paragraph 2 of article V;
- (d) assist the Participating Governments in the exchange of information and in compiling, publishing and distributing reports on the co-operative project, as appropriate; and
- (e) provide scientific and administrative support for the meetings of the project committee.

4. On the basis of the annual reports submitted by the Participating Governments pursuant to paragraph 2 of Article V and in consultation with them, the Agency shall prepare annually an overall report on the activities carried out under this Agreement, with particular reference to the implementation of the co-operative projects established in accordance with Article III, and submit it to the Meeting of Representatives.

ARTICLE VIII

1. With the consent of the Meeting of Representatives, the Agency may invite any Member State other than the Participating Governments or appropriate international organizations to contribute financially or otherwise to, or to participate in, a co-operative project. The Agency shall inform the Participating Governments of any such contributions or participation.

2. The Agency shall administer the contributions made pursuant to paragraph 3 of article V and paragraph 1 of this Article for the purposes of this Agreement, in accordance with its financial regulations and other applicable rules. The Agency shall keep separate records and accounts for each such contribution.

ARTICLE IX

1. In accordance with its applicable laws and regulations, each Government Party shall ensure that the Agency's safety standards and measures relevant to a co-operative project are applied to its implementation.

2. Each Government Party undertakes that any assistance provided to it under this Agreement shall be used only for peaceful purposes, in accordance with the Statute of the Agency.

3. Neither the Agency nor any Government or appropriate international organization making contributions pursuant to paragraph 3 of article V or paragraph 1 of article VIII shall be held responsible towards the Participating Governments or any person claiming through them for the safe implementation of a co-operative project.

ARTICLE X

Any Government Party to this Agreement and the Agency may, where appropriate and in consultation with each other, make co-operative arrangements with appropriate international organizations for the promotion and development of co-operative projects in the areas covered by this Agreement.

ARTICLE XI

Any dispute which may arise with respect to the interpretation or application of this Agreement shall be settled through consultations between the parties concerned, with a view to the settlement of the dispute by negotiation or by any other peaceful means of settling disputes acceptable to them.

ARTICLE XII

Any Member State of the Agency in the area of South Asia, South East Asia and the Pacific or the Far East according to the Statute of the Agency may become a Party to this Agreement by notifying its acceptance thereof to the Director General of the Agency.

ARTICLE XIII

1. This Agreement shall enter into force upon receipt by the Director General of the Agency of the second notification of acceptance in accordance with article XII. In the event such notification is received by the Director General of the Agency prior to the expiration of the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology of 1972, as extended in 1977 and in 1982, this Agreement shall enter into force on the date of expiration of the said Agreement. With respect to Governments accepting this Agreement thereafter, it shall enter into force on the date of receipt by the Director General of the Agency of the notification of such acceptance.
2. This Agreement shall continue in force for a period of five years from the date of its entry into force.
3. The co-operative projects established under the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology of 1972, as extended in 1977 and in 1982, which are being implemented as of the date of entry into force of this Agreement, shall be considered as co-operative projects under this Agreement.

DONE in Vienna, on the second day of February 1987, in the English language.

ANNEX 7 (a)

Comment on the Third Extension of the RCA Agreement
by the Government of Australia

Article II

It is Australia's hope that although the agreement mentions only one annual meeting, there will continue to be two main meetings as under current practice. It is also hoped that the practise hitherto on general timing for and content of these meetings will be continued.

Article VI

It is suggested that the holding of Project Committee Meetings be arranged in such a way so as to minimize travel costs associated with the RCA. One method would be to have a common project committees which could examine each individual sub-project, as well as overview the generic program.

Article VIII

Although the Agreement provides for any Member State other than the participating Governments to contribute financially or otherwise to, or to participate in, as co-operative project, it is Australia's view that it is preferable for regional countries to be encouraged to adhere to the RCA.

Annex 7 (b)

Comment on the Third Extension of the RCA Agreement
by the Government of India.

1. Article VIII & Article X:

In Articles VIII (1) & X there appears to be some contradiction. Article VIII (1) enjoins that the Agency may invite any Member State other than the Participant Governments or appropriate international organizations to contribute financially or otherwise or participate in a co-operative project with the consent of the Meeting of Representatives. Article X, on the other hand, permits the Agency in consultation with any Government party to the revised Agreement to make co-operative arrangements with appropriate international organization for the promotion and development of co-operative projects in the area covered by the revised Agreement i.e. without the necessity of consent of the other parties to the Agreement or the meeting of Representatives. We believe that the Article X runs counter to the spirit of Article VIII. We are of the view that Article X should therefore be deleted, Or modified suitably to incorporate the clause for consent of meeting of representative for arrangements proposed in Article X.

2. Article II & Article VI:

We note that item 2 of article II and item 3 of article VI of the Working Draft of the Agreement (28 August 1986) which was circulated to RCA Member States, specified that all decisions shall be taken by consensus. These items have been dropped in the revised draft Agreement circulated wide Agency's letter of February 9, 1987. We fell that this concept should be retained in the revised Agreement as it is of considerable significance to the working of RCA. We strongly believe that decisions on

projects of co-operative nature in this Region should be based on the spirit of mutual understanding, and co-operation and hence be taken by consensus. The past experience of RCA has also shown that much can be achieved by consensus. We, therefore, strongly advocate that a suitable clause specifying that decisions be taken by consensus should be introduced under article II and VI of the revised Agreement.

3. We note that under the revised Agreement, the annual meeting of Representatives of RCA Governments is no longer linked to General Conference. We, however, suggest for consideration that since the annual meeting of Representatives of RCA Governments is required to be attended by senior officials of the Governments, since it has to take policy decisions on various aspects of operations of RCA. Since these senior officials also attended the General Conference, there is merit in holding the annual meeting of the Representatives preceding the General Conference. Besides, since the annual meeting of Representatives normally lasts only one day, it would involve additional burden and time in case the meeting is held at a place other than the venue of the General Conference and at a different time.

ANNEX 7 (c)

Comment on the Third Extension of the RCA Agreement
by the Government of Japan.

The Japanese delegation basically supports the text of the revised RCA which most of the participating Member States supported in this meeting. The Japanese delegation also is pleased to express that it understood through discussions in the meeting that the Meeting of Representatives considers and approves the proposed projects by consensus of the meeting as it has been conducted until now.

ANNEX 7 (d)

Comment on the Third Extension of the RCA Agreement
by the Government of the Republic of Korea

ARTICLE II (b)

Draft: to consider and approve the co-operative projects proposed in
according with paragraph 1 of article III.

Proposal: to consider the co-operative projects proposed in according
with paragraph 1 of article III and approve them with the
consent of the Governments Parties.

ARTICLE III

Draft: At the request of a Government Party, the Agency may assist in
the preparation of a proposal for a co-operative project.

Proposal: and any Government party may request the Agency to assist in
the preparation of a proposal for a co-operative project.

ARTICLE VIII

Draft:

Proposal: (new item)

assist in the preparation of a proposal for the co-operative project which a Government Party has requested in according to paragraph 1 of article III.

ARTICLE VII 3 (c)

Draft: Provide scientific and administrative support for meetings of the project committee.

Proposal: provide scientific, administrative, and financial support for the meetings of the project committee.

ANNEX 8

RCA's INDUSTRIAL PROJECT: APPROACH, ACTIVITIES AND ACHIEVEMENTS OF THE FIRST FIVE YEARS

Ahmad Tajuddin Ali
Project Co-ordinator

1. Background

The Regional Cooperation Agreement (RCA) for research Development and Training Related to Nuclear Science and Technology, formulated under the auspices of the International Atomic Energy Agency (IAEA), came into force in June 1972 with the participation of the governments of Australia, Bangladesh, India, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka and Thailand. Today, Vietnam and the People's Republic of China are also parties to RCA.

The overall objective of RCA is to promote technical cooperation among the developing and developed countries in the Asia Pacific region in the peaceful uses of nuclear energy and related technology. The cooperation emphasized on nuclear technology applications to industries among member states so that utilization of such technology can be enhanced and accelerated, with technical information and to some extent finance provided by the IAEA.

Currently, the biggest project under RCA is the UNDP-funded Regional Project on the Industrial Applications of Isotopes and Radiation Technology, RAS/79/061. The project

was established in 1982 for period of five years and ended in December 1986. A Phase II of the project coded RAS/86/073 has been approved lasting another five years to 1991. All governments party to RCA except Vietnam are participating in the project. Funding for the project was also provided by the governments of Australia and Japan. Over the five-year duration of the project, financial contributions from UNDP, Japan and Australia (in US dollars) are 4.7 million, 1.21 million and 0.47 million respectively. Total, in-kind contributions by participating governments amount to approximately 8.0 million dollars, while additional contributions by regional industries to the project is estimated at 1.7 million dollars.

The first phase of the project was divided into five sub-projects which in all cover ten areas, encompassing specific products or industrial sectors which are relevant and important to the economy of the region, viz;

- Radioactive tracer applications in major industries such as oil and gas, petrochemicals, cement, pulp and paper etc.
- Non-destructive testing technology covering a large sector of industrial activity such as construction, civil aviation, manufacturing, transportation, etc
- Radiation Technology covering the use of radiation for :
 - * Vulcanization of natural rubber latex
 - * Curing of wood surface coating
 - * Cross-linking of wire and cable insulation

* Sterilization of disposable medical products.

- Use of nucleonic control systems in paper manufacture, steel production and mineral processing.
- Nuclear instrumentation maintenance.

2. Project Approach

As the project covers a broad scope technologies and is aimed to benefit participating countries which are at different levels of economic and technological development, specific approaches have been formulated in order to ensure the attainment of project objectives. These approaches vary from one sub-project to another and will thus be discussed separately.

a) Tracer Technology

The possible range of applications of tracer techniques in industry is vast, but its use in a particular industry or industrial plant cannot be expected to be routine. Thus, it is unlikely that any industry in the region would establish within itself a specialized tracer applications group. Instead, this role could be effectively and efficiently carried out by a centralized national facility or laboratory (Figure 1). Thus, the approach taken for this sub-project is for the project to assist member countries in the setting-up and strengthening these national laboratories through training and the provision of expert support.

b) Non-Destructive Testing (NDT)

Activities in the NDT area has been on-going in most participating countries, admittedly the level is somewhat higher and more vigorous in some than in others, which in many ways is related to the level of industrial activity in that country. The needs of industry for NDT services are generally met by either by the industry itself (e.g. the airline industry) or by specialist companies or by government agencies.

A need for rationalization and harmonization of NDT training, both within the region and internationally has been recognised. The project therefore aims to assist member countries strengthen the national infrastructure for NDT training, qualification and certification of NDT personnel through the use of uniform standards, guidelines and manuals for use in national training activities (Figure 2), which will be the main source trained manpower to meet the above needs.

c) Radiation Technology and Nucleonic Control System

Unlike the earlier two, activities in the area of radiation technology and nucleonic control system are aimed at a particular technology as applied to a particular product. The aim is thus to attract the use of the particular technology in the processing or manufacture of the particular product. Through promotional activities such as seminars and training courses, industry is made aware of the potentials and possibilities in the use of isotope and radiation technology as applied to their particular process or product, and in the end, to encourage industry to actually invest in the technology (Figure 3).

d) Nuclear Instrumentation Maintenance

Activities in this area are aimed at producing trained personnel to support the growth in demand from industry as a result of the more widespread use of nuclear instrumentation. Generally the project supports the strengthening of existing capabilities at national laboratories by providing training to engineers and technicians who will then be involved in national training programmes

3. Project Mechanisms

In order to produce tangible and quantifiable output by the end of the project period, specific mechanisms have been adopted in the implementation of the project, as illustrated in Figure 4. These include Executive Management Seminars (EMS) and workshops (both regional and national) which are aimed at creating the necessary awareness among industrial managers and decision makers on the possibilities and potentials of the particular technology as it may apply to their particular industrial activity; training-demonstration courses and individual fellowships for the development of trained manpower; and experts and consultants for the provision of specific technical input to member countries (both in the public and private sectors) in the design, planning and implementation of industrial projects.

The project relies extensively on support of individual counterparts and co-ordinators appointed by the respective participating governments to ensure the proper implementation of project activities. In addition to the formal network of Project National Counterparts which is responsible for the overall project, separate networks of

sp.11
(17)

National Co-ordinators have been established for the Tracers, Non-Destructive Testing and Radiation Technology sub-projects.

4. Project Activities

The availability of trained manpower is undoubtedly one of the most important ingredients for successful technology transfer. In recognition of this, a significant proportion of the project's financial resources has been allocated to group training. Over the last five years, a total of 37 training courses have been carried out, attended by a total of 449 participants from all the eleven participating countries. Table 1 gives a breakdown of the participants by course and country.

On the promotional side, the project has conducted three regional EMS and twelve national EMS on a specific subject within the scope of the project. The project has also supported (by providing lecturers) six national seminars and workshops as well as three national training courses, all of which were organised by counterpart institutions in the respective countries.

Numerous experts and consultants have also been despatched on specific missions either to initiate or to follow-up on earlier project activities. Consultants have also been despatched at the request of member countries to advise on specific industrial projects, particularly those at the design and planning stage.

5. Project Output and Achievements

Out of the effort of the last five years, the project

has yielded visible output in some of the areas covered by the project, while in others, the project has laid the foundations for further initiatives to be undertaken during the next five years. Project achievements vary not only from one sub-project to another, but also from one country to another.

Common to all sub-projects, however, has been in the area of human resources development. As seen from Table 1, practically all the countries have benefitted from the training programme carried out under the project. These training courses have been designed to provide basic information about the particular technology on which the participants could further develop on their return to their respective countries. Taken together with those people who have been exposed to the specific technologies through the Executive Management Seminars, it can be said that there is now enough people scattered throughout the region, some strategically placed in government and in industry, who are now aware of the technology, of its possibilities and potentials, and who could at the right moment influence the final decision to invest in the technology.

On specific project achievements, it would be best to consider them on a sub-project-by-sub-project basis, summarized as follows :

a) Tracer Technology

The project has helped to strengthen Central National Laboratories in participating countries through the training of manpower and the provision of experts. To facilitate coordination of project activities and promote information exchange, in particular with reference to specific industrial

tracer project undertakings, a regional network of government-nominated National Coordinators have been established for the sub-project.

As a direct outcome of project initiatives, a commercial company has been established in Malaysia to provide service to industry in the general area of isotope applications. The company, working closely and in collaboration with the Nuclear Energy Unit in Malaysia, has carried out a few jobs in industry on a strictly commercial basis.

b) Non-Destructive Testing

The basis for rationalization and harmonization of NDT practices in the region has been established. The network of National Coordinators have agreed on the basic document for harmonization based on the draft ISO Standard for the Training, Qualification and Ceratification of NDT Personnel. While the more 'advanced' countries participating in the project, namely Republic of Korea, India and China already possessed national schemes, other have none. Through the project, all participating countries are now working towards having their own national schemes, following closely to the ISO recommendations.

The project has helped established NDT societies in Sri Lanka, Bangladesh and Malaysia and helped rejuvenate activities of NDT societies in Thailand and Philippines. Earlier this year, the National Certification Board for NDT personnel were established in Bangladesh and in Malaysia. To help project implementation at national level, National Committees for NDT have been formally established in

Bangladesh, India, Indonesia, Republic of Korea, Malaysia, Sri Lanka and Thailand.

From this year, the project has been providing experts to assist in the conduct of national training courses organised by the counterpart organization in the participating countries. This was a new element not included in the original project document.

c) Radiation Vulcanization

A training and demonstration centre was established at PAIR in 1983. Taking into account the actual state of the development of technology, it is now acknowledged that facility had been built too early. In 1986, through the IAEA fellowship programme, a research team was assembled to further develop the technology of radiation vulcanization of natural rubber latex. Results produced to date have been very encouraging. The whole process is now better understood. It is now possible to produce radiation vulcanised natural rubber latex with good chemical and mechanical properties, consistently.

A national project has been established in Indonesia to investigate the feasibility of using irradiated latex as the raw material for the production of condoms for the National Family Planning Board. Factory trials were carried out beginning February 1987. Results are very encouraging. When completed, this will represent a major break-through in the effort to commercialize this technology.

d) Curing of Wood Surface Coating

A training demonstration facility has been

established at PAIR in 1984. Unfortunately, the high cost of operation of the plant has led to minimal use of the facility for trial productions. Consequently, the level of skill acquired by the operators have not been satisfactory. Efforts are being made to interest local wood companies to use the facility for pilot production of electron-beam cured wood panels.

The National Executive Management Seminars held in Kuala Lumpur and in Bangkok in December 1986 have generated strong interests, with one company in Malaysia now seriously looking into the feasibility of investing in EBC for wood panel coating and another company in Thailand for printing and packaging. In India, a large wood panel company is in the process of installing a coating line, initially for curing with ultra-violet radiation.

e) Cross-Linking of Wire and Cable Insulation

Activities in this sub-project started with the participation of China in the project in 1985. So far, two training courses have been successfully carried out and two National Executive Management Seminars are scheduled for early 1987. Out of these efforts, there are positive indications of interest in the technology in the Republic of Korea, India and Pakistan.

f) Radiation Sterilization of Medical Products

This is another area where there have been visible success. One commercial company has been established in Thailand in 1984 for the production and sterilization of disposable medical devices. The investment in the gamma

radiation facility amounted to approximately 1.1 million US dollars. In addition to this, there are to-day a number of industrial radiation sterilization projects which are at various stages of implementation in Pakistan, China, Philippines and Malaysia, with expected start-ups between 1987 and 1989. Another project has been identified in Sri Lanka where a proposal is under preparation for submission to UNDP, to be implemented as a country project.

g) Nucleonic Control Systems

This is perhaps the most successful area in terms of actual investment made by industry in the technology. In Thailand alone, seven NCS units costing about 3.5 million US dollars have been installed in various paper manufacturing plants since the start of the project. In Malaysia, one mine has installed an on-stream analysis system costing 0.25 million US dollars for their ore processing line. In the steel industry, NCS units have been installed by a few steel mills in India, to some extent as a result of project activities.

h) Nuclear Instrumentation Maintenance

The activities under this sub-project have enabled over 50 engineers and technicians mainly from national laboratories to be trained in the area of industrial nucleonic instrumentation. They have provided opportunities for them to observe and learn of modern instrumentation maintenance planning and strategies in true industrial environment.

6. Conclusion

The first phase of the project has now ended. The first two to three years have been concentrated largely in the building of the required infrastructure such as the training and demonstration centres, but the last two have been significant in the actual production of outputs. The results achieved to date have in general been very satisfactory.

Where appropriate, certain changes in the mode of implementation and emphasis were made, particularly in the last two years, so as to optimise the use of project resources and to achieve project objectives.

Project outputs are visible and quantifiable in some areas while in others, a strong foundation has been laid, thus providing a greater probability of success in the attainment of project objectives in all areas during phase II.

/ras-p12/March 5, 1987

Table 1

RAS/79/061 - REGIONAL INDUSTRIAL PROJECT
SUMMARY OF COUNTRY PARTICIPATION IN REGIONAL COURSES

| COURSE | Country | | | | | | | | | | | | Total By Course |
|----------------------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------|
| | No of Courses | BGD | PRC | IND | INS | ROK | MAL | PAK | PHI | SIN | SRL | THA | |
| Tracer | 2 | 2 | 2 | 3 | 2 | 1 | 2 | - | 3 | - | 2 | 4 | 21 |
| N D T | 7 | 4 | 5 | 9 | 9 | 7 | 17 | 9 | 4 | 24 | 10 | 20 | 123 |
| Rubber | 3 | 1 | 1 | 3 | 7 | 1 | 2 | 2 | - | - | 4 | 4 | 25 |
| Wood | 3 | 3 | 2 | 3 | 7 | - | 2 | 2 | - | 1 | 2 | 4 | 27 |
| Wire / Cable | 2 | 3 | 7 | 4 | 2 | 3 | 3 | 3 | 2 | 1 | - | 3 | 31 |
| Medical Products | 4 | 2 | 4 | 7 | 6 | 5 | 4 | 6 | 3 | 3 | 3 | 8 | 51 |
| Paper | 5 | 4 | 2 | 9 | 6 | 2 | 6 | 3 | 3 | 3 | 5 | 16 | 59 |
| Steel | 3 | 3 | 2 | 4 | 1 | 3 | 1 | 3 | 2 | 1 | 2 | 6 | 28 |
| Mineral | 3 | - | 1 | 7 | 2 | 1 | 4 | 2 | 7 | - | 1 | 2 | 27 |
| Nuclear Instrumentation | 5 | 4 | 2 | 8 | 7 | 5 | 5 | 4 | 3 | 2 | 6 | 11 | 57 |
| Total | 37 | 26 | 28 | 57 | 49 | 29 | 46 | 34 | 27 | 40 | 35 | 78 | 449 |

FIGURE 1

TRACER TECHNOLOGY

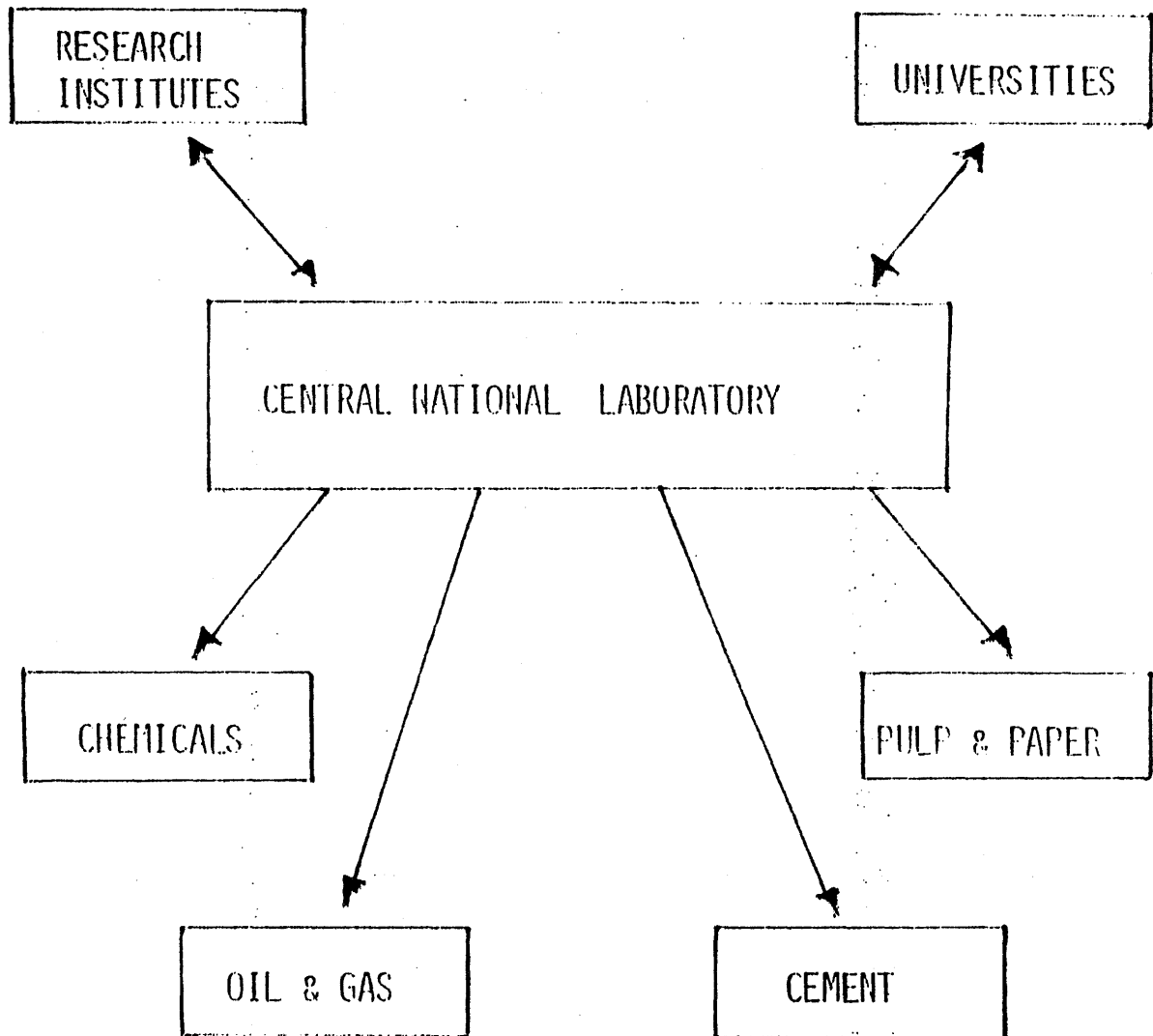


FIGURE 2

NON-DESTRUCTIVE TESTING

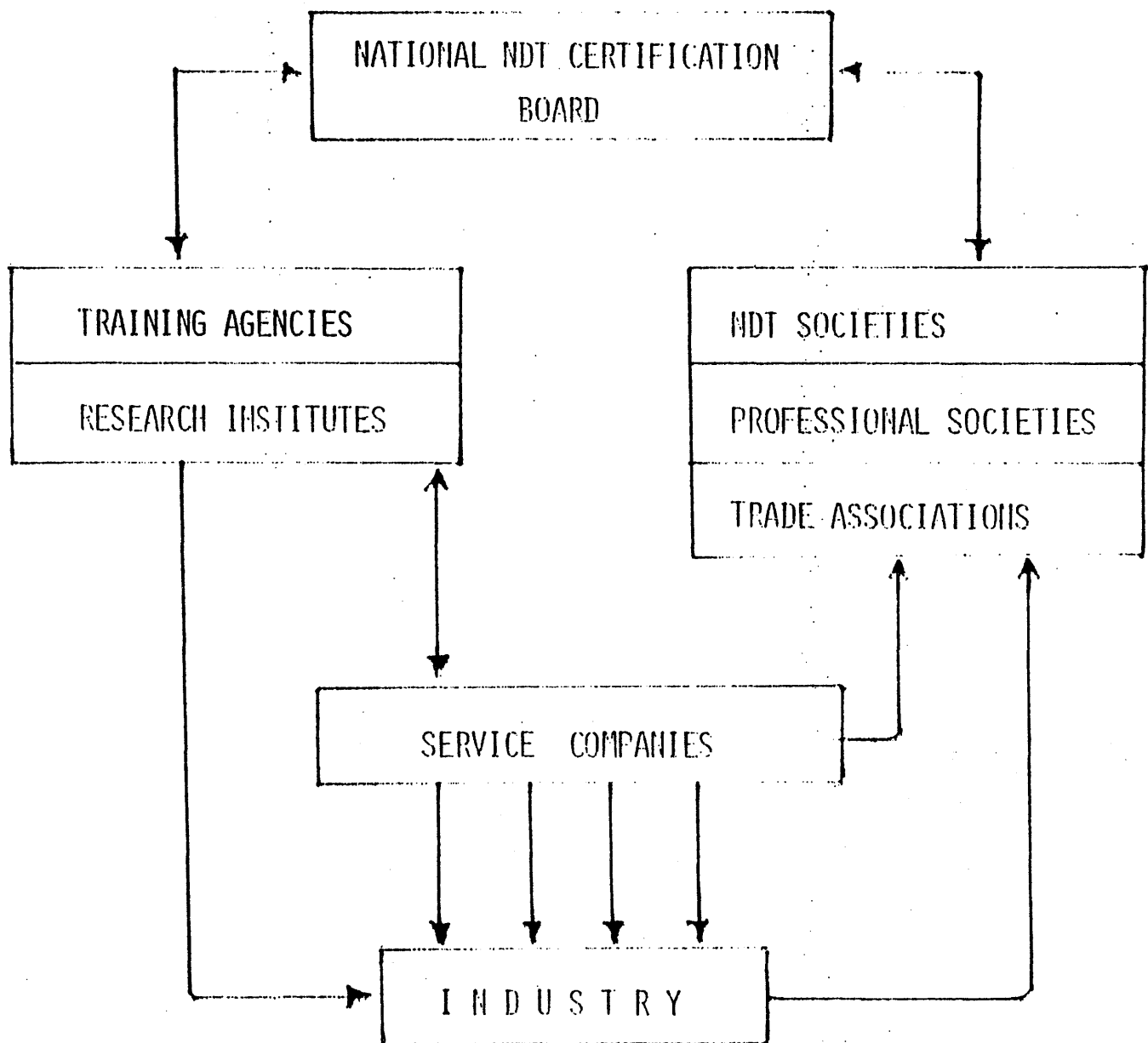
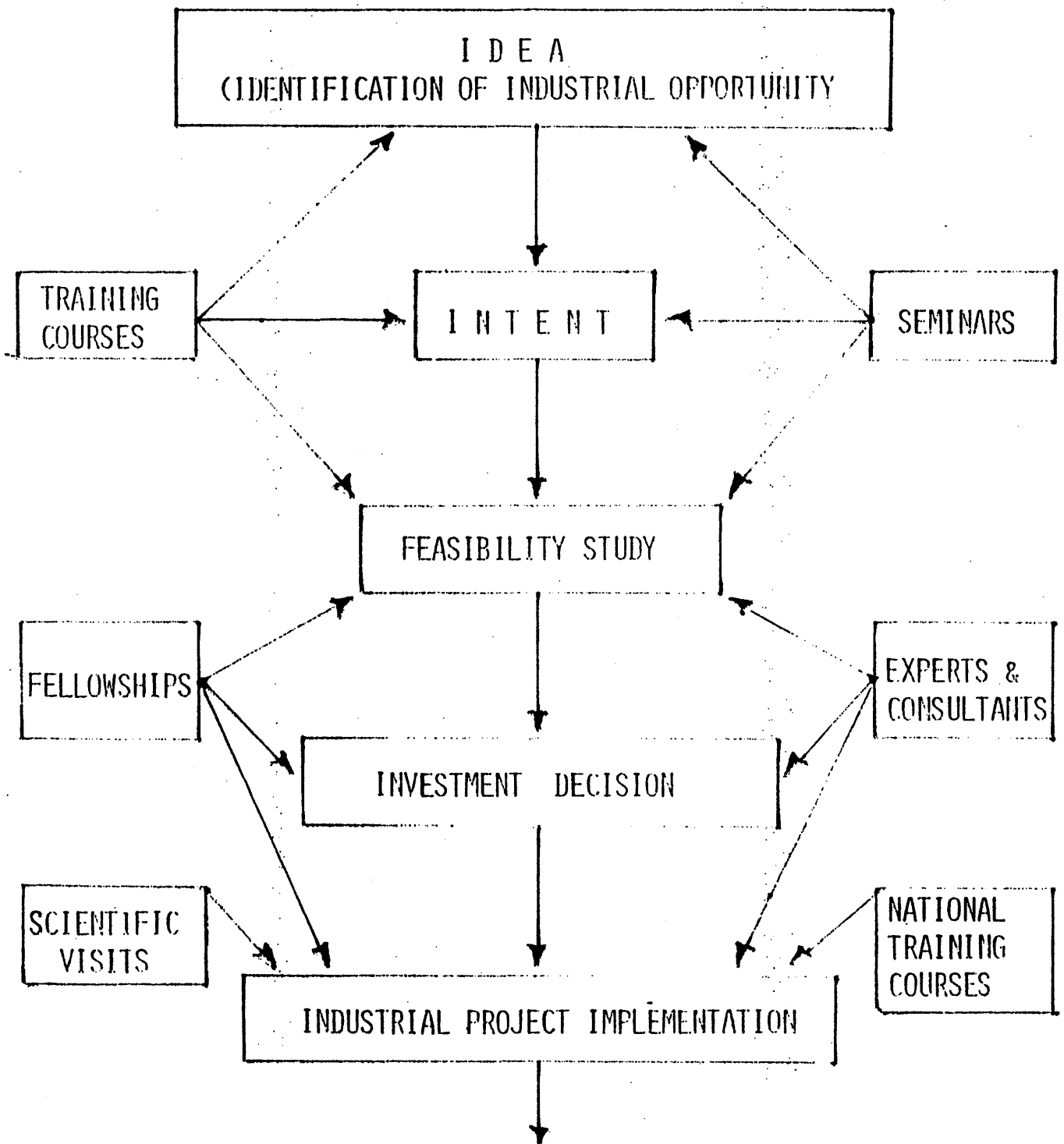


FIGURE 3

INITIATION OF INDUSTRIAL PROJECT



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 and Indonesia.

Project:

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 - 1986:

(1) 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.

2. Of the total of sixteen Research Contracts and six Research Agreements awarded, fourteen contracts and all six agreements were renewed during 1986. The offer of Contract made to India was withdrawn since the institute concerned failed to return the signed contract agreement form back to the Agency. The contract awarded to China had to be terminated as there was no renewal application forthcoming for the first renewal of the contract.

Proposed Activities - 1987:

1. All contracts and agreements are due for renewal in 1987.
2. The 2nd Research Coordination Meeting is planned for August/September 1987 in Colombo, Sri Lanka.

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

Project Officer: Paisan Loaharanu

Participating Member States: Australia, ^{China?} 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) disinfection and decontamination of stored products,
- (b) improvement of hygiene and storage ability of processed seafood,
- (c) insect disinfection of fruits for quarantine purposes, and
- (d) sprout inhibition of onions and potatoes.

Major Activities:

1. RCM on RPFI Phase II
The RCM was 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 contract or agreement holders attended the RCM and the Seminar.
2. Second Meeting of the Project Committee of the RPFI Phase II.
The meeting was held at Zhejiang Guest House, Hangzhou, China on 14-15 April 1986. Representatives of all 11 Governments party to the Agreement Establishing the RPFI Phase together with an observer from Japan attended the meeting. The meeting reviewed the progress of the work conducted in the past year and adopted action plans on technology transfer on food irradiation to local industry. Special emphasis was made on economic feasibility studies, transportation trials, market testing and consumer acceptance studies of selected irradiated foods in the coming year.

3. On-going Research Contracts/Agreements

| <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 speices |
| Korea, Republic of (H.O. Cho) | 4238/CF | Approach to the commerical 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 trails on radiation preservation on onions under tropical conditions |
| Philippines (C.C. Singson) | 4234/EB | Pilot plant studies on the technoeconomic feasibility of food irradiation in the Philippines |
| Sri Lanka (Dr. Munasiri) | 4396/AG | A comparative study of the efficacy of fumigation and gamma irradiation of spices |
| Thailand (K. Nouchpramool) | 4279/AG | The application of gamma-irradiation for the extended commercial storage of root crops |
| Vietnam (Dr. Bui Thi Yen) | 4397/AG | Control of moulds in dried cuttle fish by gamma irradiation |

Major Activities

Proposed for 1987: 1. Next RCM on RPFI Phase II

This RCM is tentatively planned to be held in Kuala Lumpur, 5-9 October 1987. All contract/agreement holders under this programme will be invited to attend.

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

This meeting will be held in conjunction with the RCM mentioned above. The meeting will not only review the achievement obtained under the RPFI Phase II from the beginning but also will consider whether the Agreement Establishing RPFI Phase II should be extended.

3. Expert Mission to Review Achievements under RPFI Phase II

The mission consisting of an expert on food irradiation from Australia, a representative of the Food Preservation Section, IAEA and possibly an outside consultant, will visit 4-5 selected countries in the region to review achievements under the project from the beginning. Recommendation will be made on future action plans if feasible. The mission is foreseen for 3 - 4 weeks prior to the RCM and the Project Committee meeting of the RPFI Phase II mentioned above.

Project Title: ISOTOPE APPLICATIONS IN HYDROLOGY AND SEDIMENTOLOGY

Project Officer: Y. Yurtsever

Participating

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

Project

Description: The project has the overall objective of introducing and/or strengthening the capability of using environmental isotope applications in hydrology in the region. Number of field applications with environmental isotopes have been undertaken within a Co-ordinated Research Programme. Low level tritium counting facilities have been established in most of the countries involved in the programme.

Major

Activities (1986): Most of the applied field investigations dealing with various hydrological problems are completed and overall data and results obtained are being compiled into final reports by a number of institutions. Advisory services on interpretation and evaluation of isotope data are provided to several countries in the region.

Major Activities

Proposed for 1987: A consultants mission will be carried out to those member states in the region where analytical facilities are established within the scope of this project to review and to make a final check on the performance of the systems. Two consecutive meetings will be organized to discuss and review the overall spectrum of isotope applications in hydrology in the region. An Executive Management Seminar of 3 days duration to be followed by a Workshop on Isotope Hydrology (10 days) is being planned to be held during 1987.

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BASTING
6/87

P r o s p e c t u s

- Title: REGIONAL (RCA) EXECUTIVE MANAGEMENT SEMINAR ON ISOTOPE TECHNIQUES IN WATER RESOURCES DEVELOPMENT AND MANAGEMENT
- Place: Beijing Institute of Uranium Geology, Beijing, People's Republic of China
- Date: 15-17 June 1987
- Deadline for Nominations: 8 May 1987
- Organizer: The International Atomic Energy Agency within the framework of the Regional Co-operation Agreement (RCA). The host institute of the seminar is the Beijing Institute of Uranium Geology, People's Republic of China.
- Participation: The seminar will be open to 10 participants from IAEA Member States in the Asia and Pacific region which have taken part in the regional RCA programme in Isotope Applications to Hydrology and Sedimentology.
- Participants' Qualifications: The seminar is aimed at senior decision-making and management level of staff of institutions that have primary responsibility in water resources inventory, planning and development.
- Background Information: The seminar will involve presentation of a series of lectures by invited speakers and discussions concerning prospective use of nuclear techniques in the overall domain of hydrology. The emphasis will be on the potential impact of nuclear techniques in solving specific hydrological problems to provide the managerial level senior staff with an overview of the

potential use of the nuclear techniques in hydrology. The participants are expected to make presentations on the general hydrological activities and problems involved in their respective countries so that potential applications of nuclear techniques can be discussed and delineated during the meeting.

Scope:

The lectures and discussions will cover the use of environmental and artificial tracer methodologies for specific hydrological problems encountered in water resources inventory, planning, development and management.

Application

Procedure:

Nominations including a short CV should be submitted to the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria. Nominations received after the above-indicated deadline cannot be considered. It is suggested that advance information of the nominations be submitted by telex with the following short information: name, age, academic background, present position and address, to enable the IAEA to make preliminary evaluation of the candidates.

Administrative
and Financial
Arrangements:

Candidates selected will be informed in due course and they will be provided with full details of procedure to be followed with regard to administrative and financial matters.

The IAEA will cover the cost of participants' round-trip air travel from their home countries to Beijing and back.

During their attendance of the seminar, participants will be provided with a Daily Subsistence Allowance at the prevailing UN rate.

P r o s p e c t u s

- Title: REGIONAL (RCA) WORKSHOP ON ISOTOPE HYDROLOGY FOR ASIA AND THE PACIFIC
- Place: Beijing Institute of Uranium Geology, Beijing, People's Republic of China
- Date: 18-26 June 1987
- Deadline for Nominations: 8 May 1987
- Organizer: The International Atomic Energy Agency within the framework of the Regional Co-operation Agreement (RCA). The host institute of the workshop is the Beijing Institute of Uranium Geology, People's Republic of China.
- Participation: The workshop will be open to 10 participants from IAEA Member States in the Asia and Pacific region which have taken part in the regional RCA programme in Isotope Applications to Hydrology and Sedimentology.
- Participants' Qualifications: Candidates should have a university degree or equivalent and extensive practical experience in hydrological, hydrogeological and/or geological investigations related to water resources inventory and development.
- Background Information: The workshop will benefit practising hydrologists, hydrogeologists, geologists and engineers who are currently involved in problems related to water resources inventory and planning activities. The workshop will involve a series of lectures that will provide detailed information on methodological aspects

of application of nuclear techniques in hydrology. The participants are also expected to make presentations either on any isotope field application they may have already undertaken in their respective countries or on any current hydrological problem they are involved in where isotope applications may be considered.

Scope:

The workshop will comprise a series of lectures to be delivered by invited speakers. Both environmental isotope techniques and artificial tracing methodologies as applied to a wide spectrum of hydrological problems will be covered and discussed during the meeting.

Application

Procedure:

Nominations including a short CV should be submitted to the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria. Nominations received after the above-indicated deadline cannot be considered. It is suggested that advance information of the nominations be submitted by telex with the following short information: name, age, academic background, present position and address, to enable the IAEA to make preliminary evaluation of the candidates.

Administrative

and Financial

Arrangements:

Candidates selected will be informed in due course and they will be provided with full details of procedure to be followed with regard to administrative and financial matters.

The IAEA will cover the cost of participants' round-trip air travel from their home countries to Beijing and back.

During their attendance of the workshop, the participants will be provided by the IAEA with a stipend sufficient to cover the cost of their accomodation, food and incidentals.

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 descriptions:

The Co-ordinated Research Programme was established to identify and make available by mutation 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:

Institutes participating in the programme in 1986 concentrated their efforts on evaluation of mutants previously obtained by mutagenic treatment.

Some developed mutant lines are already used in rice breeding programmes or directly propagated and already tested in National Yield Trials. Such promising mutants were obtained from the variety Basmati 370 in Pakistan and India, from variety Nizersail in Bangladesh or from Saratus Malas in Indonesia. A lot of efforts were dedicated to improvement of local, traditional varieties which were of great value for inhabitants because of their characters (e.g. special taste and aroma). Mutants obtained under this programme are improved in such important trials as earliness and yield but other preferable grain characters still remain, which make them very attractive for local marketing.

During the 1986 seasons a much larger number of semi-dwarf mutants were included in the genetic study. It was confirmed that many mutants have been found as being non-allelic to the main known semi-dwarfness gene (Dee-Geo-Woo-Gene). Most of these mutants can be used in rice breeding programmes because of very good agronomic performance.

Major activities proposed in 1987:

It should be noted that the main objectives of these programmes have already been achieved in most countries participating in this Co-ordinated Research Programme. For this reason the final years' activity will be concentrated on summarizing results and using mutants in rice breeding programmes. The exchange of mutant seeds among institutes participating in this programme should be an important part of the last years' activity. All these problems will be considered during the Final Research Co-ordination Meeting in this programme which will be held in Hangzhou, China in July 1987. Papers presented during this RCM will be published in the Agency TECDOC series and distributed to all countries of Asia and the Pacific Region.

Subject: Follow-up of RCA Project on improvement of grain legume production in Asia.

Project Officer: A. MICKE

1. Background

The RCA project "Induced Mutations for Improvement of Grain Legume Production in South East Asia was carried out since 1977 as an IAEA sponsored Coordinated Research Programme with cooperation between Indonesia, India, Pakistan, Bangladesh, Sri Lanka, Republic of Korea, Thailand, Malaysia and the Philippines. Breeders in Asia have by now released to the farmers the following varieties of grain legumes derived from induced mutations:

| | | | |
|----|----------------------|---------------------|------------|
| a) | <u>Groundnut</u> | Yueyou No. 22 | China |
| | | Changhua No. 4 | China |
| | | Yueyou No. 551 | China |
| | | Vikram (TG 1) | India |
| | | TG 3 | India |
| | | TG 4 | India |
| | | TG 17 | India |
| | | Fu 21 | China |
| | | Sin pa detha | Burma |
| | | Co 2 | India |
| b) | <u>Pigeonpea</u> | Trombay Vishaka - 1 | India |
| | | Co 3 | India |
| | | Co 5 | India |
| | | TAT 15 | India |
| | | TAT 10 | India |
| c) | <u>Chickpea</u> | Hyprosola | Bangladesh |
| | | CM 72 | Pakistan |
| | | Kiran | India |
| | | Ajay | India |
| | | Atul | India |
| | | Girnar | India |
| d) | <u>Hyacinth bean</u> | Co 10 | India |
| e) | <u>Soybean</u> | Tainung No. 2 | China |
| | | Raiden | Japan |
| | | Heinong No. 4 | China |
| | | Heinong No. 5 | China |
| | | Heinong No. 6 | China |
| | | Heinong No. 7 | China |
| | | Heinong No. 8 | China |

| | | |
|----------------------|-----------------|---------------|
| | Raiko | Japan |
| | Fengshou No. 11 | China |
| | Heinong No. 16 | China |
| | Tiefeng 18 | China |
| | Kex 2 | Rep. of Korea |
| | Heinong No. 26 | China |
| | Nanbushirome | Japan |
| | Mushi No. 6 | China |
| | Liaodou No. 3 | China |
| | Bangsa - Kong | Rep. of Korea |
| f) <u>Lentil</u> | Ranjan | India |
| g) <u>Lupine</u> | Chittick | Australia |
| | Eregulla | Australia |
| h) <u>Bean</u> | Pusa Parvati | India |
| i) <u>Pea</u> | Hans | India |
| j) <u>Azuki bean</u> | Beni-nambu | Japan |
| k) <u>Black gram</u> | Co4 | India |
| | TAU 1 | India |
| l) <u>Mungbean</u> | Co4 | India |
| | Pant Moong 2 | India |
| | TAP 7 | India |
| | NLAB Mung 28 | Pakistan |
| | NLAB Mung 13-1 | Pakistan |
| | NLAB Mung 20-21 | Pakistan |
| m) <u>Cowpea</u> | Amba | India |
| | Shreshtha | India |
| | Swarna | India |
| | V 240 | India |
| | Co5 | India |

The above mentioned RCA project was terminated in July 1986 with a final research coordination meeting (proceedings to be published by IAEA). The valuable mutant germ plasm and the released mutant varieties, of course, are available to breeders in other FAO and IAEA Member States.

2. Follow-up project

In following this remarkably successful programme, in November 1986 a new Regional Asian Coordinated Research Project was started with the aim to improve symbiotic nitrogen fixation of grain legumes and through this, improve yield and/or save nitrogen fertilizer. The mutant germ plasm now available from the above mentioned grain legume mutation breeding will be utilized in this work.

Participating countries are so far Bangladesh, China, India, Republic of Korea, Pakistan, Sri Lanka, Malaysia, Thailand and Indonesia. Financial support for an initial period of one year has been provided by UNDP under a subcontract with IAEA attached to the FAO/UNDP Regional TCDC Project RAS/82/002 (research and development of coarse grains and legumes in Asia and the Pacific region). Using these funds, a first Research Coordination Meeting was held at Chiang Mai (Thailand) 17 - 21 November 1986 to work out detailed project plans for 5 years. To carry out the projected work, funds still have to be sought.

A. Micke/ct/3267G

25 February 1987

**QUANTITATIVE EVALUATION OF NUCLEAR MEDICINE PROCEDURES
FOR THE DIAGNOSIS OF LIVER DISEASES**

Project Officer:

R. Ganatra

Participating member states

Bangladesh, India, Japan, Pakistan, Philippines, Thailand, Singapore, South Korea, Sri Lanka, Vietnam

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 representative clinical liver images by various physicians of the participating countries on the basis of quantitative scores by R.O.C. analysis.

Major activities:

During the year 269 phantom liver images were analysed by the ROC methods. The accuracy of interpretation from institution to institution and from country to country was compared. The accuracy for different countries in this region varied from 91 to 76%. There was no difference in the quality of the images obtained with scanners or gamma cameras.

79 sets of interpretations for 116 clinical liver images from Japan were also analysed. Most of the countries appeared adept in diagnosing single or multiple space occupying lesions in the liver. However, there was a marked variation in the grouped country-wise efficiencies in identifying diffuse liver diseases.

Major activities proposed for 1987

167 clinical images collected from the participating Asian countries have been distributed to all the participants. The analysis of the interpretations of these images will be carried out during this year. Further phantom images received during the year will also be analysed.

Attempts are being made to publish about 100 representative liver images in the form of an Atlas.

Japan may be holding a course on "Quality Control of Imaging Instruments with Special Reference to Liver Diseases" during this year for technicians from the RCA region.

The third and the final RCM of this programme is proposed to be held at Bangkok during September 1987.

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, Thailand. A project from Pakistan failed to start because of the delay by the national authorities in purchasing hyperthermia equipment and was terminated in 1985. A project from Singapore was terminated in 1985 due to the difficulties in building up clinical material which resulted in very slow progress. A project from Sri Lanka was terminated in 1986 because of the death of the Chief Scientific Investigator.

Project objectives: 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.

Major activities in 1986: Three agreement holders and three contractors are continuing their investigations according to the plans adopted. Dr. T. Sugahara, an Agency agreement holder from Japan, and Dr. Y. Tanaka, a Japanese expert, undertook a visit to India (Bombay and Madras), Singapore and Malaysia from 18 February to 1 March 1986. The aim of the visit was to make personal contacts with the participants of the co-ordinated research programme (CRP) and to stimulate and motivate the participants in solving difficulties should there be any. In his report to the Agency, Dr. Sugahara stressed the great significance of Agency financial support to the participants and, at the same time, suggested that the sum for each contractor be increased from the usual sum of US\$ 5000 to US\$ 6000, as US\$ 5000 is not enough to cover all expenditures under conditions of inflation.

From 1 to 5 September 1986 the second research co-ordination meeting (RCM) was held at Agency Headquarters in Vienna. This RCM was held jointly with the RCM of another Agency CRP on a similar subject. Thus the participants, altogether sixteen persons, of the two RCM's had the opportunity to more widely discuss their projects and to exchange ideas with their colleagues from all over the world. In addition, the participants had the possibility of attending the IAEA/WHO international symposium on radiation therapy in developing countries - present status and future trends, which was held in Vienna at the same time to present at the symposium their papers and to participate in the discussions.

From 6 to 26 October 1986 the regional training course on brachytherapy of uterine cancer using manual and remote after-loading techniques was held in Kuala Lumpur, Malaysia. Twenty three participants from eleven Member States attended the course and were trained in conventional and modern treatment techniques.

Proposed activities in 1987: The final RCM will be held in Madras, India, from 27 to 29 November 1987. A consultants' meeting to plan a new CRP on intracavitary radiation therapy for uterine cancer in RCA countries might be held in December 1987 in Japan or Malaysia if funds are available.

P r o s p e c t u s

- Title: REGIONAL (RCA) WORKSHOP ON PHOTON, ELECTRON AND NEUTRON DOSIMETRY IN RADIOTHERAPY
- Place: Korea Cancer Centre Hospital, Seoul, Republic of Korea
- Date: 8 - 19 June 1987
- Deadline for nominations: 15 April 1987
- Organizers: The Government of the Republic of Korea, through KAERI in co-operation with the International Atomic Energy Agency, within the framework of the Regional Co-operation Agreement (RCA).
- Participation: The workshop will be open to 15 participants from IAEA Member States in the Asia and Pacific Region, which are already involved in radiotherapy.
- Participants' Qualifications: Candidates should have a university degree or equivalent and extensive practical experience in radiotherapy dosimetry.
- Background information: The proposed workshop will benefit those who are currently engaged in dosimetry in radiotherapy, who wish to be informed of a broad range of techniques as practiced in the host institute in particular and the Asia and Pacific Region in general.
- The course will be conducted at the Korea Cancer Centre Hospital which is involved with the treatment of cancer and general patients and performs both clinical and basic research in the fields of cancer pathology, nuclear medicine, human radiation hazards, epidemiology etc. It is equipped with the

most up to date medical and research facilities including the MC 50 Medical Cyclotron System, the NT neutron therapy system and the MM 22 medical microtron system.

Scope:

The workshop will comprise a series of lectures on radiation physics, clinical dosimetry, medical applications and biological effects of radiation. A number of practical demonstrations and inspections of facilities will be arranged. Participants will be invited to present a brief country report on radiation therapy and dosimetry.

Course
outline:

The following areas will be covered:

1. Physical concepts of radiation dosimetry
2. Clinical dosimetry
3. Calibration and instrumentation of dosimetry systems
4. Therapy planning
5. Radiation protection dosimetry
6. Medical application and biological effects of radiations.

Application
procedure:

Nominations should be submitted in duplicate on the standard IAEA application form for training courses. Completed forms should be endorsed by and returned through the official established channels (the Ministry of Foreign Affairs, the National Atomic Energy Authority or the Office of the United Nations Development Programme); they must be received by the International Atomic Energy Agency, P.O. box 100, A-1400 Vienna, Austria, by 15 April 1987. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered.

It is suggested that advance information of the nominations be submitted by telex with the following short information: name, age, academic background, present position and address, to enable the IAEA to make preliminary evaluation of the candidates.

Administrative
and financial
arrangements:

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

The Government of the Republic of Korea will, out of their contribution to RCA, defray the cost of the participants' round-trip air travel from their home countries to Seoul and back.

During their attendance at the workshop, participants will be provided by the Government of the Republic of Korea, with a stipend sufficient to cover the cost of their accommodation, food and incidentals.

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 Agreements - Australia
Research Contracts - Bangladesh
China
India (2)
Indonesia
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 (1986): Sera and urines from patients with filariasis or schistosomiasis were assayed for parasite antigens, using an immunoradiometric assay (IRMA) and monoclonal antibodies (MABs). Work was continued on developing an IRMA for malaria antigens using the MABs provided by the institute at Bangkok.

From the studies carried out, the feasibility of the IRMA was demonstrated for detecting parasite antigens in sera and urines of patients with filariasis or schistosomiasis, and in blood of patients with malaria; and the assays were found to have diagnostic potential. An interesting result was the possibility to quantify filarial or schistosomal antigens in urines, which is both more accurate due to the absence of interference by patients' antibodies, and more practical since blood collection in remote areas is often difficult.

Results from these studies were discussed at a RCM at Kuala Lumpur during September 1986. The participants requested that the CRP be extended to March 1987, without additional funds, to enable them to carry out one final trial to confirm the results that have been obtained.

Major Activities proposed for 1987: The CRP has been extended to March 1987 to enable one more trial to be carried out with all the assays.

Estimated Budget 1987: No funds are requested and the CRP will be concluded at the end of March 1987.

Project title: Aerosol inhalation imaging for the diagnosis of respiratory diseases in the developing countries.

Project officer: R. Ganatra

Participating member states: A letter soliciting participation in a proposed new CRP is sent to the RCA Member States.

Project description: In the nuclear medicine units of developing countries, the investigations of lung are seldom carried out. On the other hand, in the developed countries, lung imaging is considered as a life saving vitally important diagnostic technique. Normally the lung function studies are carried out by studying perfusion and ventilation of lungs. The ventilation studies are carried out by radioactive gases which are usually difficult to obtain in a developing country. Ventilation studies can be substituted by radioaerosol inhalation imaging where aerosols can be produced by a suitable generator from commonly used ^{99m}Tc labelled radiopharmaceuticals.

A consultants meeting was held in March 1986. The group advised that 1) initially the study should be restricted to chronic obstructive pulmonary diseases (COPD), 2) we should obtain a nebuliser generator developed by B.A.R.C. in India and 3) restrict the programme initially for R.C.A. countries.

COPD is quite common in the developing countries. It is one of the chronic ailments causing lot of morbidity. The reasons why it is common are manifold, such as sequale of acute and chronic respiratory diseases, ravages of partially treated tuberculosis, atmospheric pollution and chronic smoking. In developing countries, an overwhelming majority of the rural households rely principally on traditional fuels like firewood, cow-dung and agricultural wastes for cooking purposes. In closely huddled residencies this subjects the housewives to inhalation of pollutants leading to high incidence of obstructive type of lung diseases. The aerosol lung imaging will lead to early recognition of COPD and effective management before irreversible damage sets in. It can also provide similar type of information for assessment of damage to lungs in asymptomatic smokers.

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 (withdrawn by Malaysian
Malaysia authorities)

Dr. P. Prakongvong RC/3413
Thailand

Dr. Le Van So RC/4337
Viet Nam

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 ^{99}Mo . 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 ^{98}Mo (η, γ) ^{99}Mo 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 $(\eta, \gamma)^{99}\text{Mo}$ with performance characteristics similar to the fission ^{99}Mo -based chromatographic generator.
- Thorough quality control tests through detailed investigations of the parameters indicative of the generator performance.

Major Activities
(1986):

- A new research contract was awarded to investigators from the Institute for Nuclear Research, Dalat, Viet Nam. The aim of this research is to develop a ^{99m}Tc generator based on molybdate gels of Zr and Ti.
- With the purpose to test further the low temperature sublimation generator developed in Hungary under the auspices of Research Contract No. 3361, an international independent evaluation of the generator performance was initiated by providing to several laboratories (India, Indonesia, Pakistan and Viet Nam) with a generator prototype. Researchers from Australia will receive, under a loan basis, the generator currently undergoing tests in Yugoslavia.

Major activities
proposed for 1987:

- The results of the international evaluation will be discussed during the next coordination meeting. A report will be prepared.
- A joint coordination meeting between the two subgroups of this CRP (Europe and South East Asia and Pacific) will be held in Indonesia during the last quarter of 1987. It is expected that both groups will benefit from each other's experience.

Bandung
10/87

REPORT TO THE NINTH RCA WORKING GROUP MEETING, COLOMBO, SRI LANKA, 23-26 MARCH 1987

1. Project title: CRP on radiation sterilization practices for tissue grafts in clinical use for Asia and the Pacific region (RCA activity)
2. Project officer: R.N. Mukherjee
3. Participating Member States: Currently participating in the CRP are eleven RCA Member States as follows: Australia, Bangladesh, China, India, Indonesia, South Korea, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. Also included are two other non-RCA Member States, i.e. Burma and the United Kingdom, to help to provide the advanced technical inputs on the CRP topics and the relevant support services, as applicable.
4. Project objectives: In general terms the overall objectives of the CRP and of its individual research contracts and research agreements deal with the regional development and co-ordination of adequate techniques and processes for radiation sterilization of non-viable tissue grafts for their safe clinical/surgical usage in the reconstruction of tissue-damage-associated health disorders. In the context of the adaptation of this radiation processing technique and technology to the specified local regional environment and health-care needs, due attention is paid to the (i) microbial bioburden of the pre-sterile processed tissue allografts and their radiation response characteristics pertinent to the sterilization process validation; (ii) status of availability (or non-availability) of needed tissue allograft types in the national health services system to set the emphasis and priority of the operational protocol for tissue sterilization, including the avoidance as practicable of any wasteful duplications of efforts; (iii) socio-religious factors in some of the countries in the region in the form of taboos against direct procurement of cadaveric tissues, which it is tried to solve by the choice for research and development of suitable tissues of human (homograft) or animal (xenograft) origin which are not associated with the above-mentioned taboos; (iv) through the fostering of regional co-operative efforts, the promotion of public awareness and information, and a building up of the technical infrastructure in tissue banking, are achieved to help up-grade the standard of health care through peaceful uses of nuclear techniques and irradiation. The activities centering on tissue graft radiation sterilization have developed in most of the RCA Member States as an extrapolation of the radiation sterilization of medical supplies to include novel species of medical care items, such as bone, nerve, amnion, dura, fascia, among others. In this way the installed national ⁶⁰Co gamma irradiators in the countries concerned gain some added throughput with consequent health-care returns.
5. Major activities in 1986: As has been reported earlier, research support under the CRP has continued in the RCA country institutes on the optimization of the radiation sterilization process development for a spectrum of tissue allografts, such as bone, amnion, skin, dura and fascia. Processed and sterilized tissue grafts have subsequently been provided to the relevant surgical specialists to help sustain their clinical trials and to follow up as an intrinsic means for quality control and further clinical improvements of tissue allografts.

PWills The first research co-ordination meeting (RCM) of the CRP participants was held in Colombo, Sri Lanka from 24 to 28 November 1986 in conjunction with the relevant UNDP/IAEA/RCA/RAS training course (held from 24 November to 5 December 1986). Tissue banking of radiation sterilized allografts was reported at the RCM by the scientific investigators from Thailand (Bangkok and Shongkla); Pakistan; Indonesia; China; and the Philippines. Additional complementary impacts of relevant expertise/experience dissemination on tissue banking management were achieved through the topical theoretical and practical lessons of the UNDP training course. *C of Q + N. Heald*

The RCA regional attendees at the training course and at the RCM, respectively, have formulated and submitted a document to the RCA Co-ordinator, Mr. P. Airey, requesting on a regular basis in the RCA region technical co-operation activities on tissue banking in health care. This proposal, if it meets with favourable consideration and approval at the forthcoming Ninth RCA Working Group Meeting in Colombo, might serve as another important landmark for the RCA Asia and Pacific region in the field of health-care promotion through the provision of radiation sterilized tissue allografts.

The international tissue banking experts from the United Kingdom, USA, and other countries in Europe, and from Australia, who were involved in teaching at the training course, generously provided current tissue banking literature and guidelines to the RCA members to help implement the relevant health-care services.

6. Proposed activities in 1987: Research support, co-ordination and technical information dissemination on the radiation processing of tissue allografts for safe clinical use will continue under the CRP within the frame of the RCA activities. Some of the participants in the UNDP/IAEA/RCA/RAS training course have expressed interest in follow-up through joining the CRP. This therefore anticipates some new research contracts besides the renewal of the existing contracts and agreements. The proposed plan for TC-supported training courses, and other activities, if approved, are expected to start only from 1988 onwards.
7. Budget for 1987:

| | |
|--|-------------|
| Research contracts including new projects and renewals | US\$ 35 000 |
| RCM (none in 1987) | |
| Total | US\$ 35 000 |

UNDP/IAEA/RCA TRAINING COURSE ON RADIATION STERILIZATION
OF HUMAN TISSUES
COLOMBO, SRI LANKA, 24 NOVEMBER TO 5 DECEMBER 1986

I. All participants, except the one from Indonesia, attended the Colombo Training Course.

II. Output

1. Fifteen participants from seven RCA countries trained on the current techniques of radiation sterilization processing of human tissue allografts for their safe clinical surgical use.

2. This dissemination of technical know-how involving radiation processing thus upgrades the health-care status in the RCA region. Treatment of trauma patients in the RCA countries suffering tissue damage due to prevalent accidents, degenerative diseases and other congenital defects can now be improved by a better local/regional availability of tissue allografts duly procured, radiation sterilized and preserved under the guidelines of tissue-banking facilities.

3. The participating experts received at the course the detailed practical know-how for tissue allografts such as bone, amnion, skin, dura and fascia which consist of the main bulk of the grafts needed. In addition they received technical guidance for handling and sterilization of some more subtle grafts such as heart valve, microvessels, nerve and arterial conduits.

4. The training should thus help to further enlarge the utility scope for their existing national irradiator (cobalt-60) facilities involved in the promotion of radiation sterilization of medical supplies (UNDP/IAEA/RAS Industrial Project).

5. It should further promote a net potential saving of the national budgetary resources currently used for the importation of tissue grafts.

6. The course provided detailed inventory and operating principles of tissue-banking equipment including the deployment of batch-type cobalt-60 gamma irradiator source and held an expert demonstration of the factors of indications and contra-indications of the donor evaluation and criteria for specific tissue procurement and their radiation processing to attain an optimal clinical advantage.

In conclusion, it may be expected that all the course participants will maintain a follow-up through indigenous tissue graft processing research as the fore-runner of their national tissue bank for radiation-sterilized grafts to sustain an improved health care.

III. Observations

(a) The UNDP/IAEA/RCA Training Course participants have all along expressed an active interest in the theoretical and practical lessons provided and in the

topics concerned.

(b) The course seems to have succeeded in providing them with a comprehensive picture of the tissue sterilization for clinical use in reconstructive surgery/therapy and the tissue banking. This is reflected in the comments of the participants given during the course in their evaluation sheets. Nevertheless, some of them have expressed the desirability of further actual surgical demonstrations of such allograft species. The 'unfeasibility' of such surgical display in such a training course with heterogeneous participation of surgeons, medical technicians, health service planners, among others, was subsequently discussed and generally recognized.

(c) The course participants have unanimously admitted the significant role which the course (UNDP/RCA/TC) has played in waiving many of their misconceptions regarding the clinical utility of tissue allografts and the beneficial effects of ionizing radiation in tissue sterilization as compared to other conventional agents. Furthermore, they now feel confident that this low-technology radiation processing method is easily achievable in their existing conditions.

(d) The factors of socio-religious restrictions prevailing in the several islamic countries in the RCA region could be largely overcome through the available machinery of regional inter-country co-operation to help sustain health care services concerned. This has been repeatedly stressed in the discussions by the course participants and in their relevant operational approaches of adopting tissue research with amnion for burns dressing to start with (e.g. Pakistan, Indonesia, Bangladesh).

(e) The course participants submitted an appeal/proposal to the RCA co-ordinator for maintenance of this co-ordination in the RCA region through technical co-operation activities of training, research support and dissemination opportunities.

Project RAS/6/011

| | |
|-------------------------------------|---|
| <u>Project Title:</u> | Radioimmunoassay of Thyroid Related Hormones |
| <u>Project Officer:</u> | R.D. Piyasena |
| <u>Participating Member States:</u> | Bangladesh, <u>Burma</u> , China, <u>D.P.R. Korea</u> , India Indonesia, Malaysia, Pakistan, Philippines, Republic of Korea, <u>Singapore</u> , Sri Lanka, Thailand, Vietnam |

It is to be noted that every country invited by the Agency to join in this project is now a participant.

Project objectives: To transfer the appropriate technology as would reduce costs and improve analytical reliability in the measurement of thyroid related hormones, T4, T3, and TSH by radioimmunoassay (RIA). The techniques concerned, which continue to remain the most reliable and convenient for the study of thyroid status, are very relevant to the health care needs of the Asian region where an estimated 400 million people suffer from disorder resulting from Iodine deficiency alone. They are by far the commonest procedures carried out in RIA laboratories.

The present practice of carrying out these procedures by heavy dependence on commercial RIA kits is most cost ineffective and, moreover, often leads to practises, adopted for economic reasons, which severely compromise the quality of the results. The project proposes to correct this situation by organising the transfer, in stages, of the appropriate technology for the establishment of "in house" assays. This would reduce costs from over a dollar per tube, as at present, to a tenth of that amount, thus removing the economic constraint to the adoption of good RIA practice such as duplicate estimations and the inclusion of quality control samples. The project would then go on to stimulate the local production of reagents which, after proper testing, would replace the imported material. Self sufficiency to the degree compatible with scientific and economic benefit is being aimed for. Parallell with these activities, the project encourages a teaching and training programme with emphasis on the production and use of bulk reagents, computer based data processing, and the establishment of external quality assessment schemes within the scope of a centrally organised national radioimmunoassay service in each country.

Major activities 1986: A survey of over a hundred laboratories in the participant countries has been carried out by the IAEA Project officer during which an assessment of current RIA practices, work loads, equipment and staff strength, etc. was made. A panel of Experts, convened by IAEA in May 1986, made the recommendation that the most suitable source for the initial supply of bulk reagents, from several investigated by the IAEA Project Officer, should be NETRIA, U.K., there being no supplier within the region from whom a complete package of the required materials was available. A meeting of national coordinators was held in Jakarta in August, at which the details of implementation of the project within each country was decided upon. This was followed by a successful training course on "The Production and Use of Bulk Reagents for RIA of thyroid related hormones", in Bangkok, December 1986, at which training on the use of bulk reagents was given to selected senior radioimmunoassayists from participant countries at a "train the trainers" level.

The bulk reagent distribution scheme is also underway in Sri Lanka, Malaysia, and Singapore, which countries expressed readiness to receive them in 1986 itself. All other countries would be receiving supplies of reagents from January 1987, or very soon thereafter, under IAEA "subsidy" for a prearranged period.

Twenty six IBM PCXT compatible computers have been purchased by IAEA and distributed to selected participant laboratories, for use in RIA data processing, including processing of quality control results, with a software package also chosen and distributed by the Agency.

Promising activities in the field of local reagent production is ongoing in certain countries such as India and China. Preliminary testing of these has been carried out with a view to their more general use in the project in the future.

Proposed activities 1987: The major component of the bulk reagent distribution scheme gets underway from January 1987 and all participant laboratories will receive them by mid 1987 at the latest. All laboratories that have been picked to receive computers will do so, also by this time.

A major activity planned will be a further Regional Training Course on "Data Processing in RIA", in Jakarta, 2-20th March 1987, during which the use of the computer based data processing (DP) facility will be introduced to participants.

The progress of the scheme, particularly the use of the bulk reagents and the DP package will be closely monitored by the IAEA Coordinator who plans to carry out a follow up survey of participant laboratories. A further meeting of national coordinators is also planned for the latter part of the year.

Activities in the field of local reagent production will receive more emphasis in 1987. Possible alternative sources of reagent supply, particularly in India and China, will be followed up and the material produced tested further in more laboratories than has been done in 1986.

Short term training fellowships for selected individuals from participant laboratories are planned for 1987, as also Agency assistance towards the implementation of national training courses.

If the scheme continues to be a success, the next major step would be the establishment of national (or regional) External Quality Assessment schemes (EQAS), and the possible extension of the project to cover other analytes of clinical importance as well.

The project has been received with enthusiasm by participant countries all of whom, through their national coordinators, have expressed agreement with both its concept as well as its method of implementation. A major constraint to its success, however, is a lack of funds. More than 100 laboratories have wished to join in the project but available finances have permitted the inclusion of less than half that

number. Even for these, the initial supply of bulk reagents at Agency cost can only be made for a much shorter period than the 1 year originally proposed. Twice the number of computers than it has been possible to buy, at least, could be meaningfully used. These defects which have been the cause of some disappointment in participant countries that hoped that the Agency would adhere to its original proposal, could be rectified were sufficient funds to be released for the purchase of reagents, computers and software, and for training activities including fellowships and national training courses. Funds are also required for the proposed establishment of EQAS in late 1987 or 1988. It must also be pointed out that, for the full success of a regional project of this sort, the original time schedule proposed is too short, particularly to ensure success in indigenisation of reagent production and the establishment of EQAS. It is requested that the Project be extended for 1-2 years from its scheduled closing in mid-1988, in order that its present achievement be built upon and its complete success ensured.

This would be even the more necessary in view of increased Agency activity soon to be undertaken in the thyroid field, for example, project E1.03, "To optimize and apply nuclear techniques for the survey of thyroid function in endemic goitre areas", with which project RAS/6.011 would be closely linked.

Project Title:
CO-ORDINATED RESEARCH PROGRAMME ON NUCLEAR TECHNIQUES FOR TOXIC
ELEMENTS IN FOODSTUFFS

Project Officer:
Eduardo Cortes Toro

Participating Member States:

Early? Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia,
Pakistan, Thailand

In addition, the following Member States from the RCA region have
indicated their intention of joining the programme: 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,
The Netherlands

Project Objectives

The purpose of this CRP is to obtain comparative data on 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 selected for this study. The
elements to be studied include the potentially most toxic trace
elements (As, Cd, Hg, Pb, Se). Other elements of local importance or
relevant to national monitoring programmes, such as Br, Cr, Cu, Fe, I,
Mn, Sb, Tl, and Zn, as well as radionuclides could also be determined.
It is expected that participants will use nuclear analytical
techniques, such as neutron activation analysis (NAA), for the
determination of these elements. These techniques should be
supplemented by non-nuclear techniques when necessary. 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 1986

The First Research Co-ordination Meeting for the programme took place during 4-6 June 1986 at the Bhabha Atomic Research Centre (BARC), Bombay, India. The meeting was attended by six participants from the region and three others from countries outside the RCA region, as well as by a number of local observers.

Proposed Activities for 1987

During the present year the Agency will organize analytical quality control exercises to check the quality of the analytical chemistry procedures developed and being used at the participants' institutes. The second RCM for the programme has been provisionally scheduled for the last quarter of this year. The place and exact date have not yet been decided.

87-01-13

P r o s p e c t u s

- Title: WORKSHOP (RCA) ON THE OPERATION AND MAINTENANCE OF RESEARCH REACTORS
- Place: Bhabha Atomic Research Centre (BARC), Bombay, India
- Date: 16 November - 4 December 1987
- Deadline for nominations: 15 August 1987
- Organizers: The Government of India through BARC in co-operation with the International Atomic Energy Agency within the framework of the Regional Cooperative Agreement (RCA).
- Language: English
- Participation: The workshop will be open to participants from IAEA Member States with operating research reactors within the Asia and the Pacific region.
- Participants' qualifications: Candidates should be science or engineering graduates or equivalent with some years of experience in operation and maintenance of research reactors. Persons who are likely to be involved in operation and maintenance of large sized research reactors or nuclear power plants in the future are likely to derive significant benefit from the workshop.
- Background information: Interest in utilization of research reactors has been on the increase of the South-East Asia Region. At the BARC, three research reactors, viz. Apsara, Cirus and Dhruva are in operating providing facilities for research and isotope production.
- Experience gained in the operation and maintenance of these facilities over the years have provided valuable information which could be of significant use to research reactor personnel. This workshop aims to disseminate information about various aspects of operation and maintenance of research reactors.
- Scope: The workshop will consist of lectures on various aspects of operation and maintenance of research reactors by specialists in the relevant disciplines. Additionally, there will be plant tours and visits to the maintenance shops and chemical laboratories. Utilization of computers for some of the O&M functions is also proposed to be covered.
- The purpose of the workshop is to give information at a level such that O&M staff who are just starting in this field can gain sufficient expertise. Those already familiar in O&M of small sized research reactors would be able to further their knowledge towards utilization in bigger research reactors. Prospective operation and maintenance staff of nuclear power plants are also expected to benefit from this workshop in a significant manner. Some special seminars relevant to the subject are also proposed to be held.

Course
outline:

The following broad areas will be covered:

1. Operational reactors physics.
2. Reactor chemistry.
3. Radiation protection and emergency preparedness.
4. Operational aspects of reactors and their auxiliary plants.
5. Power supply arrangements for research reactors.
6. Refuelling and spent fuel handling aspects.
7. Training of O&M staff and licensing aspects thereof.
8. Technical specifications, operation and maintenance documents, reporting of unusual occurrences and safety review aspects.
9. Facilities for isotope production, research and engineering experiments.
10. Maintenance of mechanical and electrical equipments, process and electronic instrumentation.
11. Special aspects of maintenance of radioactive/contaminated equipment.
12. Utilization of experience in system/equipment modification and development of surveillance plans.

Application
procedure:

Nominations should be submitted in duplicate on the standard IAEA application forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority or the Office of the United Nations Development Programme); they must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, by 15 August 1987. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered.

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

Mr. S.K. Sharma
Course Co-ordinator
Workshop (RCA) on the Operation and Maintenance
of Research Reactors)
DHRUVA, BARC
Trombay, Bombay - 400 085
India

Telex: 117 1017 BARC IN

Administrative
and financial
arrangements:

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

The Indian Government will, out of their contribution to RCA, defray the cost of participants' round-trip air travel from their home countries to Bombay and back.

During their attendance at the workshop participants will be provided by the Government of India, with a stipend sufficient to cover the cost of their accommodation, food and incidentals.

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

P r o s p e c t u s

- Title: WORKSHOP (RCA) ON THE USE OF IBM COMPATIBLE PERSONAL COMPUTERS FOR LABORATORY AUTOMATION AND DATA ACQUISITION
- Place: Bhabha Atomic Research Centre (BARC), Bombay, India
- Date: 23 November - 11 December 1987
- Deadline for nominations: 31 August 1987
- Organizers: The Government of India through BARC in co-operation with the International Atomic Energy Agency within the framework of the Regional Cooperative Agreement (RCA).
- Language: English
- Participation The workshop will be open for 10 participants from RCA Member States within the Asia and the Pacific region.
- Participants' qualifications Candidates should be scientists engaged in experimental research in facilities like research reactors, low energy nuclear accelerators, etc. While some familiarity with computers and computer based instrumentation will be advantageous, it is not a necessary prerequisite for participation.
- Background information: During the last few years the development of Personal Computers both on hardware and software has increased considerably. At the same time PC's have become less expensive. As a consequence, the use of small computers has increased considerably and PC's have been replacing minicomputers in the laboratory, both for instrument control, data collection and data handling.
- Several instrument manufacturers already provide the instruments with the computer including software. However, there are a number of applications where the user has to choose the computer and programmes himself, either because turn-key commercial systems are not available, not good enough or too expensive.
- In such cases the user is faced with the problems of choosing the computer, to interface it with the instruments and choose, or perhaps prepare the software. He must also be able to decide when a PC is appropriate to use and when a main frame computer is better suited to solve his problem.

Scope:

The workshop will consist of a number of lectures on the hardware and software aspects of Personal Computers, with special reference to the IBM PC, and the various techniques of interfacing these to laboratory equipment. The lectures will be supplemented with a number of practical sessions and projects with IBM Compatible Personal Computers and visits to laboratories using PC based instrumentation.

The purpose of the workshop is to provide sufficient information to the users to enable proper planning, acquisition and utilization of small computers and computer-based equipment in a laboratory. It is essential to have a broad basic knowledge of these small computers, both at the hardware and software levels, and the various standard interfacing techniques. The proposed workshop aims at providing this familiarization through a series of lectures, seminars and demonstrations. The IBM Compatible Personal Computers have become more or less the industry standard and have a large software base. This has therefore been chosen for discussion in detail.

Course
outline:

I. Lectures (20 lectures of 60 minutes each)

- (a) - Introduction to IBM PC's
 - Hardware architecture
 - System software
 - Interfacing techniques
 - Communication standards
 - Peripherals;
- (b) - Assembly language and higher level languages
 - Standard software packages for data acquisition
 - Data analysis and experimental control.

II. Exercises (20 hours)

- (a) Hands-on experience on use of IBM PC's (5 PC's will be made available for this purpose).
- (b) Interfacing techniques with training kits.

III. Seminars on specialized applications (about 10).

IV. Visit to laboratories and demonstrations experiments (about 5 experiments are being planned).

Application
procedure:

Nominations should be submitted in duplicate on the standard IAEA application forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority or the Office of the United Nations Development Programme); they must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, by 31 August 1987. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered.

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

Dr. V.S. Ramamurthy
Course Co-ordinator
Workshop (RCA) on IBM PC's
Nuclear Physics Division
Bhabha Atomic Research Centre
Trombay, Bombay - 400 085
India

Telex: 117 1017 BARC IN

Administrative
and financial
arrangements:

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

The Indian Government will, out of their contribution to RCA, defray the cost of participants' round-trip air travel from their home countries to Bombay and back.

During their attendance at the workshop participants will be provided by the Government of India, with a stipend sufficient to cover the cost of their accommodation, food and incidentals.

Project title: Nuclear Instrument Maintenance

Project Officer: P.H. Vuister

Participating Member States

Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippine, Republic of Korea (ROK), Sri Lanka, Thailand and Vietnam

Project objectives

1. To assist in the development of maintenance strategies in laboratories where nuclear instruments are used;
2. To promote the exchange of experience between laboratories; and
3. To develop national strategies in instrument maintenance, including training and the supply of spare parts.

Major activities in 1986

- extended visits by IAEA expert to all participating member states.
- development, during these visits, of a computer-based maintenance scheduling system. This is now available to all participants.
- study of the spare parts problem, which will lead to a proposal for a significant IAEA initiative in this field in 1987.
- continued distribution of power conditioning equipment to participating laboratories.
- Project committee meeting in Bangkok in September 1986

Proposed activities, 1987

- Further technical visits by travelling IAEA expert.
- Train-the-Trainers refresher course for counterparts responsible for implementing national maintenance policies.
- Implementation of comprehensive spare parts service
- Implementation of a replacement instrument service.

COUNTRY STATEMENT -
AUSTRALIA - NINTH RCA WORKING GROUP MEETING

COLOMBO 23 - 26 MARCH 1987

Mr. Chairman, distinguished delegates,

Australia notes with gratification the achievements which have taken place in RCA over the past 12 months, the 15th year of achievement for the RCA.

We have seen the successful conclusion of Phase I of the UNDP Industrial Project, of which Australia sponsored the sub-project on the application of nucleonic control systems to minerals processing. It is our judgement, and we believe that of the Agency, that the project was successfully accomplished, adding a further dimension to the applications of nuclear technology in the region. Australia has considerable expertise in the practical application of nucleonic control systems which it hopes to continue to make available under RCA, and will in due course be proposing a similar project, this time for the continuous analysis of minerals (i.e. ash) in coal on conveyor belts, as will be mentioned further on.

Useful work has been done in the past year under the Regional Project on Food Irradiation, Phase II of which is being funded by Australia. A successful project Committee meeting was held in Hangzhou on 14-15 April, together with the first meeting of a co-ordinated Research Program set up under the RPFII. International trials under the RPFII are continuing to take place, and have included shipments of onions and shrimps from Thailand to the AAEC for trial irradiations. Australia's program of financial support for RPFII II will conclude in the current 1986/87 financial year. Food irradiation is currently the subject of considerable public and parliamentary attention in Australia. Two separate enquiries - one conducted by a parliamentary committee, the other by the Australian Consumers Association - are at present examining the health, safety and environmental aspects of the use of ionising radiation for food preservation and disinfestation.

Under the UNDP project on the industrial applications of isotopes and radiation technology for Asia and the Pacific, the Australian Government has recently agreed to provide the salary costs for a consultant on non-destructive testing. The consultant was made available for a total of about 70 man days since 1984 under Phase I of the Project. The Government's decision will enable continued provision of a consultant for missions under Phase II. The first Phase of the NDT sub-project has now been successfully concluded, and within Australia steps have been taken to establish an Australian standard on the qualification and certification of NDT personnel in line with project recommendations. The existing Australian qualification scheme will be modified to comply with this standard.

Australia has been consulting closely both with the Agency and with the Government of Japan on the text of the revised RCA agreement to take effect from later this year. We welcome the streamlining of procedures which will be allowed by the new umbrella arrangement, which enables project agreements to be approved by the Meeting of Representatives of RCA Governments. We also welcome several more areas of improvement over the existing Agreement including a more detailed definition of the functions and responsibilities of the Agency.

We note that it is proposed that the annual Meeting of Representatives of RCA Governments be no longer linked to the Agency's General Conference. It is Australia's hope that although the draft agreement mentioned only one annual meeting, there will continue to be two main meetings as under current practice, and that the Working Group Meeting will continue to carry its present importance. It is also hoped that the practice hitherto on general timing for these meetings will be continued.

Australia stresses the importance it places on the follow-on agreement being ready for signature at the time the existing Agreement expires. We look to an agreement which maintains the current informal and co-operative spirit of the RCA, which can now point to a substantial record of harmonious operation.

Since the last Working Group meeting Australia has undertaken considerable and detailed work in the preparation of new RCA project proposals in the areas of Medical and Biological Applications, and in the UNDP Phase II project areas of Tracer Technology in Industry, Radiation Processing, and Nucleonic Control Systems in the Minerals Industry. These proposals are now approaching final form, and are currently being examined by our aid agency, the Australian Development Assistance Bureau (ADAB). They will then be considered for funding over the next few months in the context of Australia's 1987-88 budget. I must caution that such funding is not assured. Australia is facing a situation of exceptionally tight financial stringency at the present time and all new proposals are subjected to close scrutiny. We are hopeful nevertheless of being able to provide both modest budgetary and extra-budgetary support to these project areas.

Some brief comments on these projects are as follows:

For some time we have been keen to join the project on the medical and biological applications of nuclear techniques, and intend to do so subject to the necessary Parliamentary approval. Delegates will be aware that Australia is advanced in the applications of nuclear medicine. Through the AAEC and the Australian School of Nuclear Technology (ASNT) Australia is in a good position to play a leading role in the development of technetium - 99m technology in Regional countries. It therefore is proposing a sub-project on the use of computers in technetium -99m imaging, which may be used to determine abnormalities in a wide range of organs, including the lungs, bones, heart, thyroid, liver/spleen, gall bladder, kidneys and brain. The sub-project would be carried out largely by training in Australia, and demonstration of the techniques.

Australia wishes to be closely involved in Phase II of the RCA/UNDP project as it was under Phase I. We are examining sponsorship of three sub-projects. A sub-project on radiation processing has as its objective the transfer of radiation curing technology for surface coating from relevant Australian organization to the region, building on the experience of Phase I of the Project.

Radiation curing of surface coatings is a potentially important technology for the region. In particular the properties of raw materials such as timber can be markedly improved by this process.

It is hoped to continue work in nucleonic controls systems by establishing a new sub-project through a demonstration project to be set up in the region. Thailand has expressed interest in a coal blending system being installed at the Mae Moh Lignite Mine, Northern Thailand, and we expect the feasibility of this shortly to be examined by an expert mission. It is proposed that this project should continue over 5 years, providing training courses both at the site and in Australia, where visits would be made to mines, coal preparation plants, and blending systems where ash gauges were installed. As the first stage of this project Australia expects to collaborate with the IAEA in holding an executive management seminar (EMS) later this year in Australia on nucleonic control systems in the coal industry. It would also be hoped to continue some residual work on the Phase I sub-project on on-stream analysis in metalliferous ore concentrates.

Finally, it is hoped to undertake a sub-project drawing upon the long experience of the AAEC in applications of tracer technology in a wide range of applications relevant to the region. This assistance is intended to include the offering of fellowships, the purchase of some field equipment, and the provision of expert assistance in each trainee's country.

In summary, Australia will continue to be an active participant in RCA and intends, as far as tight budgeting circumstances allow, to continue to provide both budgetary and extra-budgetary support. We remain a firm supporter of the RCA, the practical benefits it has brought to the region, and the patterns of co-operation it has fostered. In recognition of this I should like to indicate Australia's willingness to host the 1989 RCA Working Group meeting in Sydney. Should the meeting accept this invitation, we look forward to welcoming you all to Australia two years from now.

Thank you Mr. Chairman.

NINTH RCA WORKING GROUP MEETING COUNTRY

STATEMENT BANGLADESH

After evaluation of the achievements made during last 15 years, RCA countries felt the need for extension of the programme on its expiry on 1st June, 1987. There is no doubt about the benefit that the region has attained through RCA programme in various fields. Although some countries have achieved more in one field than others, the overall objective of helping each other and transfer of technology through co-operative effort have definitely been achieved. Moreover in certain fields achievements of certain Member States have encouraged others to take up these programmes and it is necessary at this stage to help them to attain the same goal. On the other hand, progress made by some Member States in certain fields calls for further effort to bring the outcome to the level of greater utilization and in some case commercialization. This needs continuation of these projects.

FOOD AND AGRICULTURE

In the field of Food and Agriculture, Bangladesh has already made considerable progress in food irradiation, improvement of grain-legume production, rice improvement and has made good progress in domestic buffalo production.

For Food Irradiation Programme 200K Ci gamma source from Russia under IAEA Technical Assistance Programme is going to be installed for preservation of potato, onion and other food items and also for medical sterilization. Originally the design was for specific food items. On the insistence of industrialists the design is to be modified for multipurpose use so that maximum utilization of the source can be made.

The installation of the first commercial irradiator is taking a little longer time. A number of private entrepreneurs are waiting to witness the success of the first irradiator before they could start their respective projects. Simultaneously inter-country transportation studies have been in progress for dried fish in collaboration with Indonesian

Atomic Energy Agency. The results so far obtained indicate that proper packaging material such as high density polyethylene, PVC, carton boxes with various stiff boards are suitable for long-term storage (9 months) and export purposes. Pilot scale irradiation of Bangladesh onions under a modified storage system has been designed which incorporated forced airflow devices for harnessing and blowing natural air all around the storage racks. It has been observed that during storage for about 6-8 months the weight loss is insignificant as against 50% loss under traditional method of storage.

For 13 target legume plants the region has already developed 58 improved varieties and released to the farmers. Bangladesh concentrated on three target plants - Mungbean, Blackgram and Chickpea and developed a number of improved varieties of which the name of a chickpea variety - Hyprosola may be mentioned. Member States in the region can continue their field investigation for use of any one of those 58 varieties already released by different countries.

In studies on improving rice varieties through induced mutation some developed mutant lines are already being used in rice breeding programme or directly propagated and already tested in National Yield Trials. Mutants obtained under this programme are improved in such important traits as earliness and yield but other preferable grain characters still remain, which make them very attractive for local marketing. Successful mutants in one Member State may be given field trials in other States for possible adaptation. Four promising mutants of Nizersail and two semi-dwarf mutants from 1R-8 evolved in Bangladesh are under field trial for final selection. Bangladesh may also go for field trials of those varieties already evolved by other Member States.

The programme on analysis for toxic elements in foodstuffs has been initiated with ultimate objective to offer analytical quality control services, and to provide validation support for their own national food monitoring programmes. In Bangladesh foodstuffs to be analysed, and

analytical methods to be used and elements to be analysed have been identified. Results so far obtained on marine fish, meat, rice, wheat, green vegetables, milk and egg indicated no abnormal level of toxic and essential trace elements.

UNDP (RCA) REGIONAL INDUSTRIAL PROJECT

Industrial Tracer Technology (ITT) programme is in the preliminary stage of its implementation in Bangladesh. So far, two project personnel at operational level have been trained in Bombay for short-term.

The centralized national laboratory to provide ITT services in industries and the national co-ordinator for the project have been identified. After holding the National Executive Management Seminar in Dhaka in 1986 and the visit of the Seminar Consultant (Dr. J.F. Easey) for the project and as per the recommendations made in the Lahore meeting of the national coordinators a project proposal for developing a Tracer Group in Bangladesh has been outlined for IAEA assistance. The priority project areas have been identified. The introduction of ITT services in Bangladesh would greatly depend on the implementation of the project proposal mentioned above.

NDT Services after initial success of rendering an excellent NDT services to the industries from a few joints in 1977 to thousands of joints in 1986, Bangladesh Atomic Energy Commission would now like to build up a strong and effective infrastructure of local NDT practitioners of international standard and to attain self-reliance in the field of NDT. For this an NDT training programme has been taken up within the framework of the UNDP/IAEA/RCA plan for Regional NDT Training and Certification for RCA countries. A National Certifying Body in the name of NDT Personnel Certification Committee has been formed with representatives from different organizations, Universities and the BAEC.

The Committee organized one four-week national training course on Radiography level-I in Nov.-Dec., 1986 at BAEC in which 15 participants from different organisations attended. This training course was based on the guide lines of RCA and RLA syllabi, Canadian manuals and ISO Standards.

In 1987 one four weeks national training course on Ultrasonic Testing level-I and one six weeks national training course on Industrial Radiography level-II will be taken up. For 1988 one national seminar on NDT, one Industrial Radiography level-I course at national level, one Industrial Radiography level-II, course at Regional level have been planned.

BAEC is yet to develop all necessary facilities including adequate number of NDT equipment and materials in order to conduct training courses as per plan. Facilities that would be specifically required include UT equipments, materials for Ultrasonic Testing course, standards, codes, radiographic references for Radiographic Training Course etc. A reference to this requirement has been made to RCA Project-Coordinator. The requirements include expert services for higher level NDT courses as well.

Radiation Technology: Out of the four subprojects under this programme significant progress has been made in Radiation Sterilization of Medical Products. The programme is ready for commercialization. Market potential has been surveyed. Necessary laboratory investigations have been done. Local producers of medical products have been successfully motivated. With the installation of one 200K Ci Co-60 gamma-source from IAEA the project work would enter into commercialization. Just before the installation one Executive Management Seminar (national) would be arranged in collaboration with IAEA/RCA. Further training in the field of sterilization of pharmaceuticals are needed at this stage.

As regards other sub-projects no significant progress can be reported except that in all these subprojects some preliminary information has been obtained and some people have been trained so as to proceed with the project work in the second phase. In the sub-project Radiation induced surface coating of wood products one private firm working on modified wood manufacturing has shown interest to use UV-radiation technology. For their future involvement on this possibility the representatives of the firm are interested to have dialogue with experts who have been associated with success of the technology elsewhere and if possible they would like to visit some installations where these works have advanced. In sub-project "Radiation induced vulcanization of rubber" Bangladesh could not proceed much on the subject except imparting training to two persons. Bangladesh did not produce much of rubber in the past. Within one decade they have been able to produce to meet 20% of the country's need. Government has now taken up extensive programme of rubber cultivation through private sector. Since there is a potential for rubber production in the country, Bangladesh, intends the to participate vigorously in this RCA programme during the second phase.

For Bangladesh the application of Nucleonic Control System (NCS) 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.

A report of the feasibility study has been prepared jointly by Bangladesh Atomic Energy Commission and Bangladesh Chemical Industries Corporation, which should be examined by experts in the line for comments and recommendations. Simultaneously Bangladesh Government is organizing funds for procurement if feasibility is recommended.

MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES

Bangladesh is a party to the agreement establishing the Asian Regional Co-operative Project on Medical and Biological Application.

In this field RCA is supporting nine projects and some more new projects have been proposed for future inclusions. Bangladesh is presently concentrating on four projects from which maximum benefit can be obtained. Bangladesh would also like to join in other important projects which are in operation. In the question of including new proposals within the umbrella of RCA may we point out the fact that if fund becomes limiting factor in the proper execution and expansion of some existing important projects then the question of new inclusions must carefully be examined. For instance, for the project "Radioimmunoassay of Thyroid Related Hormones" shortage of the fund commitments made in the original project proposal, as approved at a previous RCA meeting, has caused some disappointment amongst participating countries. For example, less than half of the number of laboratories that wish to participate are accommodated in the project as it now stands and even for these, the supply of bulk reagent at Agency's cost, intended to continue for a year, can now be maintained only for a much shorter period. The provision of computers and software for RIA data processing, an important component of the programme, has also had to be curtailed and training activities, including support for national courses and the provision of fellowships, are only possible on a much more limited scale than was intended. From reports it appears that the project has generated more interest than was anticipated when the original allocation of funds was obtained and that the number of laboratories wishing to participate as well as the range of activities expected by them are more than was envisaged. It therefore becomes necessary to support this project in a complete way instead of supporting new projects if fund constraint is visualized.

In this connection I would like to inform you that in Bangladesh four Nuclear Medicine Centres (MNC) and the Institute of Nuclear Medicine (INM) have been accepted by the IAEA as participating laboratories under this project. IAEA has agreed to supply bulk reagent to all the Centres at IAEA's cost; to supply 5 gamma counters to 4 NMC's and INM; to arrange smaller items of other equipment specially to Rajshahi, Sylhet and Dinajpur Centres to enable them to do their own radioimmunoassay and to help us training our own technical manpower.

We have received first consignment of the bulk reagents in February, 1987 and also a personal computer with accessories of data processing in radioimmunoassay. Since none of the participants could attend the training course on bulk reagent and data processing, it has become difficult for us to use these facilities. Bangladesh is in contact with RCA Co-ordinator to see that the project can be executed at the earliest.

NUCLEAR TECHNOLOGY BASED PROJECTS

1. Maintenance of Nuclear Instruments in Bangladesh. The objective of this programme is to provide good power conditioning to different laboratories and institutes of Bangladesh Atomic Energy Commission and subsequently to expand to other Institutes in the country.

On receipt of an IBM-PC, Model No. 5151 the Computerized Management for Preventive Maintenance with the help of the dBase III software was implemented. During the last year it was possible to use the system for all the laboratories of Bangladesh Atomic Energy Commission and they are in a position now extend to other sister laboratories and organizations in the country.

2. WASP Users Workshop: An official request had been submitted to the IAEA by Bangladesh, for IAEA technical assistance in implementing the WASP computer model for electrical generation system expansion planning. An IAEA Technical Assistance Mission was sent to Bangladesh from 9-13

November, 1986 with the objective to evaluate the request in terms of its potential benefit to the country and to develop a recommended programme of action, in agreement with the responsible organizations in Bangladesh.

According to the recommendations made by the mission, Bangladesh has already submitted official request for USAID funding and other followed up actions proposed. With the approval of all concerned Bangladesh would participate in the programme for 1987. Bangladesh also intends to participate in the proposed WASP Users Workshop to be held in 1987.

Before concluding I wish to thank IAEA through the good offices of DDG, RCA Co-ordinator, Project Co-ordinator for UNDP industrial project for their concerted effort to implement the RCA programme. It is our privilege to thank the Government of Sri Lanka for hosting this meeting and making our stay here comfortable.

Thanks Mr. Chairman.

COUNTRY STATEMENT OF THE PEOPLE'S REPUBLIC OF CHINA
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Mr. Chairman:

It gives me great pleasure to be here to participate in this very important 9th RCA Working Group Meeting. On behalf of the Chinese delegation, I would like to join others to congratulate you on your election as chairman of this meeting, and wish the meeting success.

In 1985 China joined the RCA, and the UNDP/IAEA Regional Project on Industrial Applications of Isotopes and Radiation Technology, it has taken an active part in the activities conducted in accordance with the agreement. In view of the success of this co-operation, the Chinese delegation supports the third extension of the RCA, and the Chinese Government has signed the UNDP/IAEA Regional Project on Industrial Applications of Isotopes and Radiation Technology, Phase II (RAS/86/073). We think, the new proposed Regional Co-operative Agreement of 1987 has more improved than the previous one, for example, the establishment of co-operative projects is no longer made subject to the conclusion of specific agreements; it will only need approval by the Meeting of Representatives of the RCA Governments.

Now let me discuss every sub-project's activities of RCA in China.

I. Industrial Application

1. Tracer Applications in Industry

In March 1987, the second IAEA Expert Mission on Tracer Applications in Industry visited China. The main task of this mission was to study the feasibility to organize a Training Course on Tracer Applications in Chemical Engineering in China. Besides, the mission also visited the Dagang Oil Field for the project on an application of tracer technique in petroleum exploitation the determination of water intake profiles in water injection wells.

2. Non-Destructive Testing (NDT)

In October 1986, China co-sponsored one UNDP/IAEA/RCA 'Train-the-trainers' Regional Course on Ultrasonic Testing and a UT-II National Training Course. The two courses were hosted by the Shanghai Research Institute of Material (SRIM). The course syllabus of the RTC that was followed, was the one that was developed by the Regional Non-Destructive Testing Project for Latin America and the Caribbean. Two instructors from Latin America, and one from Italy attended. I think this is a good example of co-operation between Asia-Pacific and Latin America, between RCA and ARCAL.

Up to now, in China, a National NDT Committee made up of representatives from various sectors that are involved in NDT, is not yet established, but the Chinese NDT Society and many committees under different ministries in our country are working towards the establishment of a unified qualification and certification scheme. In 1987, we will organize many national training courses, including two national training courses under the Agency's support, one for ultrasonic testing, the other for radiography.

3. Radiation Processing

a) Radiation Crosslinking

The Second Regional Training/Demonstration Course on Radiation Crosslinking Application in Wire and Cable Industry was held in Shanghai, at the Shanghai Applied Radiation Institute of the Shanghai University of Science and Technology (SARI/SUST) from 8 to 26 Sept. 1986. After the successful first training course, the second one emphasized the experiment and demonstration, and extended the scope of radiation crosslinking application not only to wire and cable, but also to some other applications. The participants of this training course suggested that a Research and Development Centre in the field of Radiation Processing should be established. We suggest that the SARI/SUST will be a Training Centre for radiation crosslinking in Asia Pacific Region.

In June 1987, the Second Expert Advisory Group Meeting on Radiation Crosslinking will be held in Changchun Applied Chemistry Institute of Academia Sinica.

Also in June 1987, a Research Co-ordination Meeting on 'Application of Radiation Technology in Immobilization of Bioactive Materials' will be convened at Beijing University.

b) Radiation Curing

Radiation Curing is a well established new technology. In China, this technology has been investigated and put into applications in some areas. Intensive R and D has been carried out in many cities such as Shanghai, Beijing and Yantai. There are at present more than twenty plants using UV curing for coating of products. A comprehensive pilot scale processing line for EB curing of coating on furnitures use wood panel is in operation at Shanghai Applied Radiation Institute (SARI) of Shanghai University of Science and Technology (SUST). This project is a

joint venture of SUST and the Shanghai Furniture Factory. For promoting with application of radiation curing in China and in Asia-Pacific Region, we make a proposal to UNDP/IAEA to consider establishing a program for training and demonstration of radiation technology with the commitment assigned to SUST/Shanghai Furniture Co-operation, and give some support to this joint venture. A national executive management seminar (EMS) on radiation curing will be convened at Shanghai, SARI/SUST, in Sept. 1987.

c) Radiation Sterilization

The Beijing Radiation Center is establishing a pilot plant and research centre for the radiation sterilization of medical products. In Irradiation Centres of Shanghai, Hangzhou, Nanjing, Jinan and others, there are also some on-going projects on radiation sterilization of medical supplies.

In Sept. 1986, under the large-scale Regional Industrial Technology Transfer effort in Asia and Pacific involving applications of isotopes and radiation, the Agency and UNDP organized the Second National Executive Management Seminar on Industrial Radiation Sterilization of Medical Products. The Beijing Seminar was hosted by Beijing Radiation Centre, and more than fifty participants attended.

China has participated in the Co-ordinated Research Programme on Radiation Sterilization for Tissue Grafts in Clinical Use. We welcome to host some activities (for example, the next Research Co-ordination Meeting) on this subject.

d) Radiation Vulcanization

In November last year, the Agency Mission on Radiation Vulcanization of Natural Rubber Latex (RVNRL) visited China. The expert suggested to make some R&D work on RVNRL with electron beam irradiator, and we suggest the next EAG meeting on this item to be held in China, and hope to get more communication between countries of the region.

4. Nucleonic Control System (NCS)

In China, we have paid more attention to the application of nucleonic control system or isotope gauges in some industries, for example, paper, steel and mineral industries, petroleum and coal industries, and civil engineering. In the mineral industry, the on-stream analysis and control of mineral concentrators is very useful for economic benefit not only for copper, lead and zinc, but also, we hope some gauges or instruments can be used in gold or silver mineral. In this field, last year, four Australian experts visited China, give us many good ideas between China and other countries of this region, and particularly between China and Australia.

II. Agriculture and Food

In early 1987, the third research co-ordination meeting on 'Semi-Dwarf mutants for Rice Improvement in Asia and the Pacific' will be held in Hangzhou, China, the Chinese National Rice Research Institute (CNRRI) has been nominated as sponsor institution for this meeting. China has taken part in the RCA project activities on improvement of grain legume production in Asia. In the field of nuclear techniques application to improve domestic buffalo production, China also had some activities.

In September 1986, the Agency sponsored the FAO/IAEA Regional Training Course on Plant Breeding by Using Radiation Induced Mutations at Hangzhou, Zhejiang Agricultural University (ZAU). The course was successful. We suggest that, Hangzhou, Zhejiang Agricultural University and Institute of Atomic Energy Application in Agriculture, Zhejiang Academy of Agricultural Sciences, will be an IAEA training-demonstration center for nuclear agriculture including radiation mutation breeding. We will do our best for more contribution in nuclear agriculture in Asia Pacific region.

Food Irradiation

In April 1986, the Agency organized three activities on food irradiation in China: Shanghai Seminar, Hangzhou RPFI Phase II Project Committee meeting and Study Tour. From these activities, we can see, significant progress in research and development leading to practical application of food irradiation was made by countries in the region in recent years, and China has a some advanced technology in the areas of designing and constructing pilot/commercial irradiators for treating food and other objects. Now in China, several large multipurpose irradiators are already in operation or being installed. We hope China could make a strong contribution to the region in irradiator design in the near future. At the 2nd Project Committee Meeting of RPFI Phase II, the representative of Bangladesh favoured the possible contribution of China on pilot/commercial irradiators. Now, at this meeting, we offer three different design projects to the meeting, we hope, more co-operation in this field will be successful.

At the 8th RCA Working Group Meeting, we had suggested the Shanghai Irradiation Centre (SIC) as an Asian Pacific Regional Training/Demonstration Centre do some service for all the region. We welcome all the RCA Member States using this centre for technical transfer and co-operation.

III. Medical and Biological Application of Nuclear Techniques

In China, all the sub-projects in this field were actively in work. In cancer therapy, diagnosis of liver diseases, thyroid diseases and tropical parasitic diseases, nuclear techniques are widespread applied in China. Radioimmunoassay, the application of Technetium-99m generator system, radiation sterilization of biological tissue grafts, radioaerosol inhalation imaging for the diagnosis of respiratory diseases, and radiotherapy dosimetry, all these items have some institution in China do these work. We participated in the research contract on nuclear techniques for toxic elements in foodstuffs, and welcome the next Research Co-ordination Meeting on this subject which will be convened in China.

IV. Others

In June 1987, the Agency will convene an Executive Management Seminar on Isotope Techniques in water resources development and management and a Workshop on Isotope Hydrology for Asia and the Pacific, in Beijing, China. The meeting is being organized as an activity within the scope of a regional project on 'Isotope Applications to Hydrology and Sedimentology' which has been implemented by the IAEA in the Asia and Pacific Region for the last 5 years. We think, after last year's Jakarta Seminar and this year's Vienna meeting, this is an important activity on isotope hydrology.

In China, we do some basic research work using research reactors, and the operation and maintenance of research reactor had taken some experience. We are very interested in computer application for laboratory automation, maintenance of nuclear instruments, and WASP users workshop.

Before I conclude, Mr. Chairman, I wish to express our gratitude and appreciation to the Government of Sri Lanka, to the Atomic Energy Authority of Sri Lanka and the Sri Lankan Colleagues for hosting this important meeting and hospitality extended to us, and I wish to thank all the countries which have contributed both in kind and cash to make the RCA a success.

Thank you, Mr. Chairman.

COUNTRY STATEMENT OF INDIA
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Mr. Chairman!

India is very happy to participate in the 9th Working Group Meeting of RCA members which is being held in Sri Lanka. This year marks the completion of 15 years of successful operation of the Research Co-ordination Agreement and this meeting is therefore very significant. India has been one of the founder members of the RCA, and has taken special interest in its activities over the past 15 years. India is also providing special assistance for supporting R&D activities in the field of Basic Sciences using Research Reactors under the RCA programme and has organized seminars and workshops on different aspects of utilization of research reactors in the past. We believe that RCA has served a very useful purpose in promoting regional co-operation in the application of nuclear techniques in medicine, agriculture and basic sciences. We are also very happy that this meeting is being held in Sri Lanka and we welcome this opportunity to renew contacts with the scientists of this region and particularly with those of the host country, with whom we have had long ties.

The last year witnessed the consolidation of the activities undertaken under various projects in the field of nuclear energy in the past in India. The 100 MW Dhruva research reactor at Trombay, after some initial teething troubles, and with suitable design modifications, is now continuously operating at power. As you are aware, this reactor is of totally indigenous design, and provides a powerful tool for research in advanced areas in nuclear science and technology. The production of high specific activity radioisotopes such as iridium-192 used in industrial radiography, molybdenum-99 used in nuclear medicine has commenced in

Dhruva reactor. The neutron beam instrumentation programme for utilization of Dhruva reactor at Trombay made significant progress during the last year. This is a comprehensive developmental effort and aims at design, development and installation of facilities for basic research in condensed matter, physics using hot, thermal and cold neutron scattering technique. A triple axis neutron spectrometer with the on-line computer was commissioned and is now being used for research purposes regularly. The other facilities such as profile analysis spectrometer will be commissioned during the course of this year.

The second unit of the Madras Atomic Power Station (235 MWe) which was commissioned in late 1985 has been operating satisfactorily. The work on the nuclear power station at Narora is progressing fast and the first unit of this station is expected to be critical in 1988. The work of design of prototype 500 MW nuclear power unit has started and is taking shape. The supporting activities relating to mining of uranium, fuel fabrication, heavy water production are keeping pace with the programme planned for expansion of nuclear power plants, and India now looks forward to a quantum jump in its nuclear power programme.

The production and applications of radioisotopes in medicine, industry, agriculture and research is the other important objective of the Atomic Energy programme in India. The use of radiation for sterilization of medical products has progressed significantly and plans are afoot to set up 2 or 3 radiation plants in different parts of the country in collaboration with the user industries. In order to promote the use of radioisotopes in medical diagnosis, 3 regional centres have been set up in different parts of the country which offer preparations of short-lived ^{99m}Tc to local hospitals for use in nuclear medicine and radio-immunoassay services. The use of radiation for treatment of sewage sludge will be demonstrated on a pilot scale, when the irradiator being set up at the municipal sewage plant at Baroda becomes operational later this year.

The importance of basic research for technological development is well recognized. Our effort to make the results of R&D work in basic sciences available to other technologies for accelerating the pace of technological development has paid rich dividends. In this context the work on the synthesis of materials (La-Sr-Cu; Y-Ba Cu-oxides) that exhibit superconductivity at relatively high temperatures (38; 90 K) has great potential for industrial applications. Likewise the programme of development of instrumentation for air monitoring of radioactivity has led to the development of continuous on-line monitoring systems for oxides of sulphur and nitrogen in the industrial environment.

During 1986 India conducted two important training programmes under the project on Basic Sciences using Research Reactors. A four week RCA Summer Course on the use of Reactor Neutron Beams in Study of Materials was organized at BARC during June 1986 and was attended by 8 participants from RCA countries besides several Indian participants. The course had an optimum mix of preliminary and advanced lectures and demonstrations covering different aspects of neutron scattering and its applications in study of materials and was found very useful by participants with varying degree of familiarity with this subject. Another training course on RIA techniques was also conducted at BARC during October 1986 and this was attended by 14 participants from 6 RCA countries. The participants included technicians, practising physicians and scientists responsible for setting up RIA procedures. We believe that RIA procedures have great relevance for application in many RCA countries, some of whom, unfortunately, can not use them to the extent required because of high cost of import of RIA kits. India strongly supports the Agency's co-ordinated programme for the supply of bulk reagents for RIA of thyroid hormones as the availability of bulk reagents together with trained manpower, will significantly cut down the cost of RIA procedures. India has supported this programme by providing experts for conducting training programmes organized by the Agency. We recommend that the Agency should continue to support this activity as its is particularly beneficial to countries with low financial resources.

India actively participated in the UNDP/RCA Project on Industrial Applications of Radioisotopes and Radiation. Under this project 2 major training programmes were organized at BARC during 1986. The third training-cum-demonstration in radiation sterilization of medical products was conducted at BARC during September-October 1986 and was attended by 13 participants from 10 countries of the region. The Training/Demonstration on Industrial Applications of Radiotracers was also organized at BARC for a period of 3 weeks and was attended by 13 participants from 9 countries.

As you are aware, India will conduct two workshops during 1987 under its special assistance to RCA. A 3 week workshop will be held from November 16 to December 4, 1987 on Operation & Maintenance of Research Reactors. Another 3 week workshop on Use of IBM Compatible Personal Computers for Laboratory Automation and Data Acquisition will be held at BARC from November 23 to December 11, 1987. This underscores the importance India attaches to training of manpower for undertaking different activities in various areas of nuclear technology.

We are happy to note that the second phase of the UNDP Regional Industrial Project has been approved. India will continue its support by providing training facilities and technical experts for implementing the objectives of the second phase of the project.

India also supports the programme for development of improved crop varieties by radiation induced mutations. The work carried out at BARC on the use of induced mutations for improvement of grain legumes production has resulted in release of new, improved cultivars in pigeon peas, mungbean, blackgram and groundnut. The current emphasis is on seed multiplication of the released and notified varieties. The semi-dwarf mutants developed for rice improvement are under field evaluation.

India supports the various programmes aimed at improving and extending nuclear medicine and radiotherapy procedures for providing better medical care. In this context India has agreed to provide 12 pieces of radioaerosol inhalation apparatus, of the type developed in India for aerosol inhalation imaging, for diagnosis of respiratory diseases in the developing countries. We also support the programme on use of radiation sterilization for tissue banking. India could assist this programme by providing gamma irradiation equipment developed in India, suitable for this work, to RCA Member States, if appropriate financing arrangements could be made by the Agency.

Neutron activation analysis (NAA) using research reactors constitutes another important mode of utilization of research reactors. Of the several proven applications of neutron activation and other nuclear based techniques, only the health related and environmental applications have received the attention in the programme. It would be beneficial to develop the applications for resource (mineral) prospecting and materials science, including the characterisation of pure materials for high technology.

An application of aesthetic interest is the examination of archeological artefacts; this is particularly of relevance in view of the long history of cultural relations of the people of this region.

India has, over the years, strongly advocated the expansion of RCA activity for undertaking collaborative efforts in various aspects of power generation e.g. survey for atomic minerals, power planning, reactor safety & health aspects, and waste management. We support the proposal for WASP Users Workshop planned in 1987 and also the new project proposal on Energy and Nuclear Power Planning within Asia and Pacific Region. We would like to see more projects in the areas mentioned above proposed under RCA.

We suggest that India's contribution to RCA for 1988 be used for organising a Workshop/Seminar on Radioisotope Production in Research Reactors and another on Applications of Neutron Activation Analysis in Material Science including Resource (mineral) Prospecting.

In conclusion, we wish to reiterate our faith in RCA as an instrument of establishing regional co-operation in the applications of nuclear techniques for socio-economic benefits and for building up of infrastructure for supporting nuclear energy programmes in the member countries. India whole-heartedly supports the renewed Regional Co-operation Agreement and the activities planned under the second phase of the Regional UNDP Project on Industrial Applications of Isotopes and Radiation Technology.

COUNTRY STATEMENT OF INDONESIA
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Mr. Chairman!

It is a great pleasure for me to be able to participate again in the RCA Working Group Meeting to be held here in Colombo. I would like to mention that the meeting this time notes a very important and significant mark in the history of RCA, because in this meeting a draft for a new RCA text document has been finalized and this document will become a guide for every activity or every project in the framework of RCA after having been accepted by countries in the Region.

Indonesia, as one of the RCA member country which has been officially joining this Co-operative Agreement since 16 October 1972, acknowledged the effectiveness of the co-operation among the members and the benefits gained from its participation. Therefore Indonesia will no doubt accept the text of the regional co-operative agreement for research development and training related to nuclear science and technology. A formal notification will soon be forwarded to the Agency through official channels.

The Government of Indonesia has put a considerable attention to the Atomic Energy Programme leading to the peaceful uses of Atomic Energy for the welfare of its people. The long-term programmes of nuclear science and technology cover several aspects, among which are:

- Basic Science
- Application of Isotope and Radiation
- Energy and Reactor Technology
- Fuel Element Technology
- Safety Inspection

- Manpower Development

In line with these programmes it is planned that within this year a 30 MW multi purpose reactor will be commissioned. This facility certainly may be utilized in any activity within the RCA programmes in the future.

We are very pleased to hear that finally UNDP has approved the project document for a further 5 years. We understand that during Phase II efforts will be made to devolve as much decision making as possible to the Regional office in Jakarta. We realize that the programmes of the project will be more intensive in Phase II, and consequently activities of project management will increase accordingly. Regarding this situation BATAN will make available another two rooms, with necessary office furniture, in addition to the existing rooms of project office: This would be sufficient to accomodate the increasing management activities in the next Phase.

One of the promising activities in UNDP Project on Industry is the Radiation Processing Sub-project on Radiation Vulcanization of Natural Rubber Latex. In February 1987 a condom plant in Banjarnegara West Java has been commissioned with a capacity of about 550,000 Gross/year. Radiation Vulcanization of Natural Rubber Latex was also to be used for the trial production using one of the three lines available. It was found that the quality of condom produced from RVNRL was comparable with the conventional one and met the standard. The head of the National Family Planning Board who is responsible for this plant is much impressed with this technology and very keen to apply this technology for the production of condom. So we are very optimistic that this technology will contribute to one of the main national programmes of the Indonesian Government, that is family planning programme. Attention from abroad coming from Europe where about 5 tons of RVNRL has been sent to West Germany, and followed by another 1.5 ton.

Another achievement came from the project use of induced mutations for improvement of grain legume production. Objective of the project carried out in Indonesia was to develop varieties of soybean with better yield by improving the yield components and plant type through induced mutations. From "ORBA" variety irradiated with gamma rays were obtained five promising lines. Out of these five lines PsJ/69 has shown a better performance than the other four in trials conducted at various locations. This particular line was then submitted to the national team for varietal evaluation and release. Upon the recommendation of this team, the minister of agriculture endorsed an official release of this line. This new variety has a better yield and shorter stature so that it is lodging resistant. The development of this new variety would be a positive contribution to the need of more soybean varieties for the development of soybean cultivation outside Java with a great diversity of condition with respect to soil fertility and environment. This new variety was named "MURIA".

During the period of 6 months, two events relating with project on radioimmunoassay for thyroid related hormones have been performed in Indonesia. These two events were national co-ordinator meeting held in August 1986 and train-the-trainers course on data processing in radioimmunoassay held in March 1987. As a developing country with 166 million people the Government of Indonesia gives serious attention to the development of health. It is recently realized that thyroid diseases is one of the major constraints in endocrinology diseases, particularly in areas where iodine deficiencies may disturb the development of the population. A greater attention to the development in methodology and techniques for early detection for such diseases should be given through various activities to facilitate the improvement capability, in support of the whole health development programme in the country. Therefore Indonesia will always support this project.

Investigations on physical and chemical properties of freeze dried amnio-chorion membrane as well as the total number of bacteria contaminated have been done on irradiated and unirradiated membranes in

connection with project on sterilization of biological tissue graft. The fresh samples were obtained from CIPTO Mangunkusumo hospital in Jakarta. About 150 membranes were used in this work. Parameters observed to evaluate membranes were tensile strength, water vapour transmission rate, Aw, infra red spectral and total bacterial count before irradiation and after irradiation. No significant change can be observed on physical and chemical properties of irradiation sterilized membranes compared to unirradiated ones. To protect the physical properties of freeze-dried membranes it is suggested that the membranes should be processed as quickly as possible after delivery.

The second phase of the project on the use of nuclear technique to improve buffalo production being implemented in Indonesia has two objectives, those are on nutrition and reproduction and the second on diseases. Draught power is an essential assessment in agriculture cultivations particularly in densely populated areas in Indonesia. Buffaloes therefore are very much used. To improve the draught power, nutrition is essential therefore research is being conducted now to follow the effect of nutrition on these draught power and the interactions on reproductive performance.

Further studies on the epidemiology diagnosis and pathogenesis of trypanosoma evansi infections in buffaloes are being conducted to obtain an overall picture of the spread of this disease. Trypanosomiasis is effecting the draught power and therefore could decrease the economical output of buffalo farmers.

The result of the activities conducted under the research co-ordinated agreement sponsored by IAEA is aimed to increase economical benefits of buffalo production particularly in Indonesia.

I would like to mention some events relating to RCA activities which have been conducted in Indonesia in 1986 up to March 1987.

1. Research Co-ordination Meeting on the Project on Nuclear Technique to Improve Buffalo Production.
2. Regional Seminar on Isotope Technique in Water Resources Development.
3. Meeting of National Co-ordinator on RIA.
4. Training and demonstration on wood surface coating.
5. Expert Advisory Group Meeting on Radiation Curing.
6. Expert Advisory Meeting on RVNRL.
7. Train-the-trainers course on data processing of RIA.
8. EMS on Tracer Application in Industry.
- 9) Training of there fellows from Malaysia, Thailand and Sri Lanka on RVNRL.
- 10 EMS on Radiation Curing of Wood Surface Coating.
11. Consultative Expert Mission on NCS-Steel, NCS-Mineral, NCS-Coal, Tracer, and Hydrology.
12. National Seminar on Radiation Processing.

We are honoured that the Agency has approved and appointed Indonesia for hosting a WASP User's Workshop for the RCA countries which is scheduled next December.

Thank you!

COUNTRY STATEMENT BY JAPAN
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Mr. Chairman!

Japanese delegation welcomes the opportunity of discussing the progress of the Regional Co-operative Agreement projects this year in Colombo, Sri Lanka. It appreciates the arrangements which have been done by the Government and people of Sri Lanka in this occasion.

Japan has been actively associated with RCA program since its participation in 1978 and has made the necessary financial and technical contributions required to implement projects, where significant transfer of technical skills is involved and where projects contribute to the development of participating countries.

Japan is convinced that the Regional Co-operative Agreement has achieved tangible and remarkable progress in the field of peaceful uses of nuclear energy and has gained substantial strength in its 15 years of history. In this connection Japan is aware that the RCA stands in a transitional step towards further enhanced achievement, which is interpreted in two aspects. Namely, the IAEA/UNDP Phase II project has started and secondly the review of the present RCA text is under way to a revised one which accommodates actual implementing procedures of various projects. In this connection I am pleased to see all the member states sit at the meeting table and make necessary arrangements to establish a better framework of the RCA.

As the Japanese delegation has repeatedly expressed its position on the passed occasions, principles of Japan's Economic Co-operation are based on humanitarian concerns, and it will make future co-operation to the RCA with consideration on human resources developments. Japan will

maintain its participation in Phase II of the IAEA/UNDP Project principally in three sub-projects, Radiation Technology, Non-Destructive Testing and Nucleonic Control System. The Medical and Biological Application Project is also of our concern and we will support the project particularly in the field of Nuclear Medicine and Cancer Therapy.

The Japanese Government recognizes the significance in participating in the RCA and has always made maximum effort to make as much financial contribution as possible. This year Japan will make more contribution than last year, which is the highest level of the amount in the past years. In relation to this, I would like to express my belief that Japan's contribution and participation in the program will be closely related to new RCA replacing the present agreement which expires in June this year, since my Government considers that all activities should be carried out within the framework of, and in accordance with conditions of the RCA. We hope that new Agreement be warranted and set forth in coming June and hope that Japanese contribution be used to further enhance RCA activities.

Having said this, the Japanese delegation should like to join other delegates to congratulate the success of this important meeting, and to thank the host for the contribution.

Thank you.

COUNTRY STATEMENT BY THE REPUBLIC OF KOREA
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March -- 26th MARCH 1987

Mr. Chairman!

You and your country are wonderful hosts. Thank you very much for inviting us to your beautiful country. I would also like to join with the others in extending to you my congratulations on your election, and to offer my best wishes and support for a successful meeting.

This year is welcoming the 30th anniversary of IAEA, which came into being on 29th July 1957 with the main objectives of furthering the peaceful uses of atomic energy.

Under the auspices of IAEA, RCA has been growing for 15 years and will continue to grow, becoming the best regional community for nuclear co-operation in the Asia and Pacific Region. Although RCA Programmes had only a few co-ordinated research projects at the beginning, limited funds and great differences between IAEA Regular Technical Co-operation Programmes in their formulation, administration and execution, the tremendous co-operation of all the Member States and ceaseless endeavors of the Secretary have made RCA what it is today.

We are entering a new phase of RCA activities with the third RCA Agreement Extension. Although the revision draft retains the flexibility and informality of RCA basic objectives and broad scope, the 3rd extension will bring about a great change within the framework of RCA activities.

First of all, every Government participating in RCA projects should endeavor to make contributions, even should they be developing countries. Until now, of the total amount budgeted for RCA activities, more than half has been financed by Government contributions. Through this new Articles, however, we must bear in mind that developing countries should not feel forced to make any contributions, considering the co-operative relationship between nuclear weapon states and non-nuclear weapon states in the international co-operation community of IAEA.

Another important feature is that any Member State outside the RCA, or any appropriate international organization, may participate in and financially contribute to co-operation projects. The financial contributions to RCA from advanced Member States outside Asia and the Pacific may help solve the problem of limited funds. IAEA should make further efforts to induce advanced countries outside the RCA to participate in and financially contribute to RCA projects.

We would like to note that the scope of co-operation to be conducted under the revised RCA is desirable to be expanded to include the nuclear power fields. In the Asian and Pacific Region, four countries - Japan, India, Pakistan and Korea - have commercial nuclear power plants in operation while three of them, along with China and the Philippines, have plants under construction. In reality, most countries in our region are in a position to initiate their own nuclear programme by introducing research reactors and or other facilities from advanced countries. Therefore, we are sure that nuclear power is and should continue to be an important co-operative area among the RCA Member States.

At present, Korea has six nuclear power units in operation with 4,800 Megawatts of installed capacity, about 26% of our electrical generation, with three additional nuclear power units under construction, each having 950 Megawatts. Meanwhile, two more units was launched last year.

Taking this opportunity, we are pleased to say that Korea will eagerly share with the RCA Member States its valuable experiences obtained through the implementation of nuclear power programmes.

Korea will host the Regional Workshop on Photon, Electron and Neutron Dosimetry in Radiotherapy for two weeks from June 8th 1987, open to about 15 participants from all RCA Member States. This Workshop will be conducted at the Korea Cancer Centre Hospital, which is involved with the treatment of cancer and general patients, and performs both clinical and basic research in the fields of cancer pathology, nuclear medicine, human radiation hazards and other related fields. It is equipped with the most up-to-date medical and research facilities, including the MC 50 Medical Cyclotron System, NT neutron therapy system, and MM 22 medical microtron system. We are currently considering our continued hosting of this Workshop. The final decision will be made on the basis of the results of the upcoming Workshop.

Concerning the RCA/UNDP Industrial Project, Korea would like to note with pleasure that it has entered into the Phase II this year. The project has proved an effective vehicle thus far technology transfer to local industries through the successful completion of Phase I, which had made a great contribution to expediting industrial application of nuclear technology in the Region.

Korea desires that the UNDP Industrial Project will be further expanded and accelerated for the mutual benefit of the Region in the second Phase. Korea will continue to actively participate in and endeavor to our fullest to support the RCA/UNDP Industrial Project.

Among the various sub-projects, NDT is relatively active in Korea, with about 200 members belonging to the NDT society. We have organized the UNDP National Committee for Non-Destructive Testing to include the Government, several research institutes, NDT society, and several industries. Active NDT practice is currently being carried out, with emphasis on ship-building, aircraft inspection and nuclear power plant

safety. Korea wishes for KAERI to be utilized each year as the location for regional training courses due to the excellent manpower, equipment and facilities available for regional NDT technology activities.

At this time, we are pleased to state that in Korea, the Korea Electric Power Corporation will participate in the Nuclear Power Planning Project. The Korea Electric Power Corporation has accumulated a great amount of experience since 1978 in electric generation expansion planning through the use of WASP, and has developed a personal computer-based WASP II code entitled PC-WASP. The Project in Korea will be conducted in co-operation with the Korea Energy Economic Institute and KAERI, which also have research experience in nuclear energy planning using WASP.

We look forward to being able to share our practical experiences associated with nuclear power planning with Member States through this Project.

Concerning the RCA budget, we are satisfied that there has been and will continue to be a gradual growth of total RCA funds. But, in research co-operation programs, IAEA's funds are gradually being reduced, while Member States' contributions are increasing. In particular, the IAEA Regular Budget is rapidly being decreased. As such, Korea hopes that Technical Assistance and Co-operation Fund will be greatly increased in the near future.

In conclusion, Korea wished to express its desire that this Working Group Meeting will bring about fruitful results for enhancing our regional co-operation. We are confident that the combined wisdom and efforts of all Member States will make it possible to find efficient ways for the successful operation of the RCA. We would like to see the best use of the opportunity provided by this Working Group Meeting to identify with other participants possible areas of mutually beneficial co-operation. I also would like to express my heartfelt appreciation to the Deputy Director General, RCA Co-ordinator and UNDP Project Co-ordinator for the further enhancement of RCA.

Thank your very much.

COUNTRY STATEMENT BY MALAYSIA
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Mr. Chairman!

Malaysia is very happy to participate in the 9th Working Group Meeting of the RCA Member States here in Sri Lanka in the 15th year of the RCA. As most of you are aware, Malaysia has been associated with the RCA activities since its inception and has maintained active participation in the various RCA projects over the past years. We believe RCA activities have contributed significantly to the present development of nuclear science and technology in the region and has benefited many countries. It has achieved its objective in promoting and strengthening regional technical co-operation among Member States through the use of available resources and expertise in areas of common interest. It has also resulted in the transfer of certain technologies to the industries in the region with good economic return. RCA also enhances co-operation on bilateral basis and provides a forum for technical co-operation among developing countries in the region. Malaysia has certainly benefited a lot through her involvement with RCA. In view of the success and effectiveness of the co-operation, we support the third extension of the RCA agreement for a further 5 years from June 1987.

We noticed that the new text of the agreement has incorporated a few changes to the current RCA agreement. However it still retains the flexibility of the RCA, its basic objective and scope. Some adjustments are being made to the agreement to enhance the overall co-ordination and supervision of co-operative projects and research co-ordination activities carried out under the RCA agreement. It also spelt out in detail the authority, functions, role and term of reference of the

various parties involved in the agreement. As such the new agreement becomes very much clearer. We support this positive development and as such we can accept the new text of the agreement in its present form.

At present, participation of Malaysia in the RCA activities is in the following projects:

- * UNDP Regional Industrial Project;
- * nuclear techniques to improve domestic buffalo production;
- * food irradiation (RPFI Phase II);
- * isotope application in hydrology and sedimentology;
- * induced mutations for improvement of grain legume;
- * semi-dwarf mutants for rice improvement;
- * improvement of cancer therapy;
- * nuclear techniques for the diagnosis of tropical parasitic diseases;
- * nuclear instrument maintenance;
- * radioimmunoassay of thyroid related hormones; and
- * nuclear techniques for toxic elements in foodstuff.

Malaysia signed the agreement for the Phase II of the regional industrial project end of last year. Our interests in the Phase II of the project are in the field of tracer technology, non-destructive testing and radiation technology. Three National Executive management seminars in the areas of tracer technology, medical products sterilization and radiation curing technology were held last year and received good response from the government and industrial sectors. A national seminar on the applications of isotope and radiation technology will be held in November this year to review past achievements and the prospect for future applications. We would like to request some experts from IAEA for this seminar. Malaysia also hosted the second national co-ordinators meeting on sub-project radiation processing end of last year. A national training course on radiation technology will also be held in Malaysia in November this year. In support to the industrial project, we shall be able to accept the placement of a regional expert in the field of NDT in Malaysia.

The Malaysian Government has now placed a strong emphasis on the industrialization of the country and has launched the Industrial Master Plan (IMP) for both resource-based industries as well as non-resource-based industries. Almost all the regional industrial projects fit well with our IMP. The tracer technology will play a very important role under the IMP especially to improve the quality and production in the cement, petroleum, paper and other industries. Currently one of the largest wood companies in Malaysia is considering to install a UV curing facility for surface coating of wood. In the area of Non-destructive testing, a national certification scheme programme is progressing well. A national committee for NDT was established early this year comprising 15 members from both government and industries. Five national training courses at Level I and II and one regional training course on surface method will be conducted this year.

In the area of food irradiation, our participation in RPFI Phase II is on "irradiation on black and white pepper". A pilot study on the economic feasibility of gamma irradiation treatment on black and white pepper in Malaysia was completed last year. It concluded that the installation of cobalt-60 irradiation facility or the electron beam facility will be economically feasible with throughput volume of more than 10,000 MT per year. Currently there is no port in Malaysia which handles such a high throughput volume for the export of pepper. Even the Port of Kucing where most of pepper is exported now has a throughput volume of only 5,000 MT per year. Therefore it is more logical to have a multipurpose irradiation facility in the country for food items such as pepper, cocoa bean, rice and others. A pilot study on the economic feasibility of the multipurpose irradiation of other food items such as cocoa bean, frozen shrimps, rice, fruit and vegetables. A national working committee on food irradiation has been established. Malaysia will host third RCM on RPFI and Project Committee meeting in October this year.

In the "medical and biological project" Malaysia hosted the RCA Regional Training Course on Brachytherapy of the Uterine Cancer Using manual and remote after loading techniques on 6-26 October last year. The course was attended by 23 participants from the region. The lectures were given by local lecturers with the assistance of 2 Japanese experts and one resource person from IAEA. The course was successful and beneficial. It is recommended that similar courses should be conducted again under the RCA in the future on a regular basis to enhance experience and skill of participating countries in the treatment of uterine cancer using modern technology. Malaysia will consider hosting the course again in collaboration with IAEA.

At present, Malaysia is also participating in the project "Radioimmunoassay of Thyroid Related Hormones". In Malaysia, RIA of thyroid hormones are being undertaken by only 6 governmental institutions, using commercial kits. Each laboratory is using different kits and utilizes different methods. There is no national quality control programme. The Government realizes this to be a problem and is about to register all laboratories doing RIA. It has unified the 3 laboratories at the General Hospital Kuala Lumpur and has asked the Endocrine Unit of the National University to undertake a project to develop and produce rapid RIA and EIA of hormones including thyroid hormones. Currently five institutions namely UKM, GHKL, IMR, UM and USM are taking part in the RCA project. Initially it will involve the importation of bulk reagent from NETRIA for distribution to the participating laboratories. Malaysia will receive 2000 tubes for T4, 8000 tubes for T3 and 8000 tubes for TSH under the programme but this is not sufficient to meet the requirement of each laboratory. Realising that more laboratories are interested to participate in the project and to ensure the implementation of the project as originally proposed, we would like to request IAEA to reconsider the allocation of fund for the project. As it now stands, less than half of the number of laboratories that wish to participate are accommodated and even the supply of bulk reagents of IAEA cost, intended to continue for a year, to continue for

a year, can now be maintained only for a much shorter period. The provision of computers and software for RIA data processing, an important component of the programme, has to be severely curtailed and training activities including support for national training courses and the provision of fellowships are only possible on much more limited scale than was intended.

In the field of isotope hydrology and sedimentology, in the past four years or so, the Nuclear Energy Unit has been co-operating with the various governmental agencies in solving various hydrological problems. Among the projects include study of groundwater hydrology, flowrate measurement and leakage investigation of selected dams. Under the fifth Malaysia plan (1986 -1990), similar study on environmental isotope hydrology will be expanded. We are planning to undertake artificial isotope hydrology studies in determining the hydrological parameters such as permeability, porosity, transmissivity and flow rate direction, water balance study and cloud seeding. Recently a carbon-14 rig donated by the Australian Government under the bilateral co-operation has been commissioned. Technical assistance in term of experts, training and sample analysis for O-18 and H-2 are still required from the IAEA for the implementation of the project.

As for new project proposals, Malaysia would like to organise a regional training course on the use of isotopes in soil plant studies with special emphasis on tree crops in 1989 in collaboration with IAEA. We are also keen to participate in the project related to energy and nuclear power planning.

COUNTRY STATEMENT BY PAKISTAN
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Mr. Chairman!

Pakistan has been associated with the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear and Science and Technology (RCA) from its beginning. RCA is an established valuable instrument between the International Atomic Energy Agency (IAEA) and Member States in South East Asia and the Pacific. RCA is completing 15 years of its active role during which it has achieved tangible and remarkable progress in the field of peaceful uses of atomic energy.

Pakistan is actively participating in almost all of its activities and has benefited from them either by way of training, participation in Working Group Meetings, workshops, seminars, or by undertaking a number of research contracts with the IAEA under the RCA programme. Several RCA meetings have been hosted by Pakistan including the 7th RCA Working Group Meeting held at Lahore in 1985.

1. UNDP (RCA) Regional Project on the Industrial Applications of Isotopes and Radiation Technology.

Pakistan is an active member of RCA Industrial Project and is keenly participating in the programmes under this project. Steel and paper industry, which appeared as potential users of nuclear techniques, were found appropriate in gainfully introducing these techniques by using nuclear gauges in control systems. Pakistan has greatly benefited from the participation in various training courses and Executive Management Seminars arranged under this Project. In Phase - I of the Project, about

30 personnel from Pakistan received training in various courses arranged by RCA including personnel from the Pakistan Atomic Energy Commission (PAEC) and private and public sector industries i.e. steel, paper, wire and cable, chemical, rubber and wood processing.

Pakistan would continue its role during the implementation of Phase II of the UNDP Project. During last year, Pakistan participated in the following sub-projects of the UNDP Project:

a) Tracer Technology

The first meeting of the National Co-ordinators was held at Lahore, Pakistan from December 1-4, 1986. Representatives of 8 member states participated in this meeting. The National Co-ordinator from Pakistan for this project attended the Executive Management Seminar on Tracer Technology held at Kuala Lumpur, Malaysia from January 20-21, 1986 and presented a paper on "Leakage Studies in the Heat Exchanger at a Refinery in Karachi".

Studies on the Leakage in heat exchanger at a fertilizer factory at Haripur are in progress using ^{24}Na Isotope of 10 mCi strength.

A Brochure on "Tracer Technology in Industry" is under preparation and would be provided to various industries in the country to make them aware of the use of tracers and their economic benefits.

b) Non-Destructive Testing (NDT)

Pakistan has acquired experience in NDT and would be happy to host training courses and share its expertise in this field under RCA. It is hoped that UNDP would help in this programme specially when the NDT Centre is being planned in Pakistan.

As requested earlier PAEC may be enlisted as RCA Certifying Body for NDT Certification Scheme. Several NDT training courses have been held and more than 300 personnel from private and public sector industries and

government organizations have been successfully trained over the past 12 years. Our Level-I and Level-II courses have been confirmed to RCA standards.

c) Radiation Processing.

Realising the significance of this technology, Pakistan is entering in the venture by installing a commercial Gamma Irradiator at Lahore with initial source strength of 200,000 curies. It will be used for the sterilization of medical products with provision for radiation preservation of food products to be carried out at a later stage. The plant is expected to start functioning in April, 1987 under M/S. Al-Technique Corporation of Pakistan. An International Executive Management Seminar was arranged under RCA/UNDP/IAEA at Lahore from September 20-22, 1986. Twenty-five representatives of local companies manufacturing medical products participated in this seminar. Experts/Lecturers sponsored by the RCA described various aspects of radiation sterilization of medical products.

d) Rubber Products

Pakistan would like to emphasise the use of tracer technology in rubber industry such as cross-linking of wire and cable, vulcanization of rubber latex and application of radiation to improve the quality of rubber products. Laboratory research on radiation cross-linking of wire and cable using cobalt-60 source is being actively pursued. This work is being done in close collaboration with two local industries. Two participants from Pakistan benefited from the regional training course on radiation cross-linking of wire and cable, held at Shanghai, China in 1986. Our wire and cable industries have shown their interest in this new technology. More knowledge is being passed on to local firms in the form of reports and seminars which are likely to stimulate their future interest.

e) Material Technology

Materials play an important role in the industrial development of a country and it is, therefore, suggested that programme on Material Science and Technology may be introduced in the Phase II of the UNDP Industrial Project.

f) Regional Conference on Phase I

Since the Phase I of the UNDP Industrial Project has ended in January, 1987, it is proposed that a regional conference may be arranged in order to discuss the achievements made so far and to utilise the experience of the past for better implementation of Phase II of the industrial project.

g) Duration of Experts

It is proposed that emphasis should be on short-term (about 3 months) experts to be recruited preferably from among the member states of RCA, rather than long-term experts.

Pakistan would like to take an active part in the activities of RCA to make the Phase II of the UNDP Industrial Project a success.

FOOD AND AGRICULTURE BASED PROJECTS

Agriculture plays an important role in the economic development of Pakistan with about 70% of its population, directly or indirectly, involved in agriculture. PAEC has, for the past several years, consistently endeavoured to use nuclear techniques in the improvement of crops and conservation of food products. PAEC has established 3 agricultural centres where nuclear and other advanced techniques are used in agriculture, biology and food preservation.

Todate these agricultural centres have evolved 13 varieties of wheat, rice, chickpea and mungbean through induced mutations and these varieties have been released for general cultivation in the country.

2. Regional Project for Food Irradiation, Phase II.

A project on "Commercial trials on radiation preservation of onions under tropical conditions" is in progress. Reduction of postharvest losses would increase the total availability of onions for consumption at places far away from the producing areas and would help in reducing price fluctuation to a greater extent. The Project Investigator participated in the Research Co-ordination Meeting held at Shanghai, China, 1986.

3. Semi-Dwarf Mutants for Rive Improvement

Five Semi-dwarf mutant lines from long grain and aromatic Basmati rice (DM-24, DM-25 DM-38, DM-28 and DM-179-1) out-yielded the parent variety significantly and were also resistant to lodging. Allelism test is being performed on promising dwarf mutants. From the crossing of dwarf mutants with IR-6, 2 major groups of dwarfs habe been recognized.

4. Use of Induced Mutations for Improvement of Grain Legume Production

Chickpea variety CM-72, which has high yield potential and is resistant against blight disease, has greatly helped to stabilize chickpea production in the country. Another blight resistant mutant CM-88 is ready for release as a variety. Twenty two wilt resistant mutants have also been induced in blight resistant lines to combine resistance against both the diseases. The Project Investigator participated in the FAO/IAEA workshop on "Improvement of grain legume production by using induced mutations" held at Pullman, Washington from July 1-5, 1986.

MEDICAL PROJECTS

The Pakistan Atomic Energy Commission as ever is interested in the use of nuclear techniques for public health. Eight Nuclear Medical Centres have been established in different parts of the country and the 9th Centre is under construction. These nuclear medical centres are functioning in close co-operation with almost all the major teaching hospitals in the country. At present 5 important RCA research projects in the field of nuclear medicine are being carried out. A project proposal on "Radioaerosol inhalation imaging for the diagnosis of respiratory diseases" has been submitted to the Agency for approval under RCA. PAEC is keen to intensify the applications of nuclear techniques in medical sector which could further benefit the suffering population in the country.

5. Imaging Procedures for the Diagnosis of Liver and Thyroid Diseases.

Simulated Anatomical Liver Phantom (SALP) studies were completed in the first phase of the project and the results of the analysis of phantom images were received from the Agency. Forty representative liver images from the local patients were collected and 25 of these images were sent to the National Institute of Radiological Sciences (NIRS), Japan. The images from the participating countries have been redistributed by NIRS for interpretation by the physicians who had already interpreted the Japanese liver images. The second Research Co-ordination Meeting of this project was held at INMOL, Lahore (Pakistan) from September 15-16, 1986 in which 12 delegates and 8 observers from different RCA countries participated.

6. Nuclear Techniques for the Diagnosis of Tropical Parasitic Diseases.

Pakistan is participating in malaria component of this project on detection of parasitic antigens in host body fluids. This project will

help to develop effective diagnostic methods for malarial antigen level detection. Most of the steps in this project have been worked out and in vitro culturing of plasmodium would be started soon. This Project Investigator participated in the final Research Co-ordination Meeting held at Kuala Lumpur, Malaysia from September 1-4, 1986.

7. Technetium-99m Generator Systems

Radioisotope Production Group of PINSTECH is participating in the multi-national laboratory intercomparison of new sublimation generator "Sublitech" development by the Institute of Isotopes, Budapest, Hungary. An expert from this Institute would visit Pakistan during March 1987 to demonstrate the "Sublitech" technetium generator.

8. Radiation Sterilization of Biological Tissue Grafts

Adequate number of freeze dried radiation sterilized amniotic membranes have been prepared for use as dressing. Culture studies showed no growth up to storage period of eight months and no significant differences were observed in NMR spectra of fresh, freeze dried and radiation sterilized amnion. Studies are underway to process skin and bones.

9. Radioimmunoassay

Pakistan is participating in the IAEA Technical Co-operation Project on "Preparation and bulk supply of RIA reagents for thyroid related hormones". The objectives of this project are to reduce costs and increase analytical reliability. This would lead ultimately to local preparation of reagents, introduction of improved quality control, and increased training in the performance of RIA. External Quality Assessment Scheme (EQAS) is in operation in the country co-ordinated by the Agency. The National Co-ordinator for the Technical Co-operation Project on RIA participated in a meeting of the National Co-ordinators held at Jakarta, Indonesia in August, 1986.

10. Nuclear Techniques for Toxic Elements in Foodstuffs

Studies are being carried out on "Application of neutron activation analysis to the determination of toxic elements in Pakistan Foodstuffs". The Industrial activities and the large scale use of agrochemicals tend to contaminate the biosphere with foreign chemicals which may find their way to human body through food chain, water and air. The basic food items of daily consumption of 3 groups (lower, middle and upper class) consisting of wheat, rice, pulses, vegetables, fruits, tea, meat, fish, poultry and dairy products were analysed for various essential elements and toxic elements. The intake of these elements was found within tolerable limits.

NUCLEAR TECHNOLOGY BASED PROJECT

11. Basic Science Using Research Reactors

Pakistan has been participating in "Basic Science using research reactors" and would continue to support this activity under the RCA Programme.

12. Maintenance of Nuclear Instruments

Pakistan is participating in the activities under this project. Periodic calibration and preventive maintenance of about 200 instruments have been done on routine basis. Computerization of preventive maintenance programme has been carried out and 2 persons have received specialised training in Train-the-Trainers workshops arranged under the IAEA Technical Assistance Programme. Pakistan would like to propose the establishment of Regional Nuclear Instrumentation and Control Centre in the country with emphasis on applied aspects of nuclear instrumentation. A participant from Pakistan attended Research Co-ordination Meeting on this project at Bangkok, Thailand from September 1-5, 1986.

13. WASP Users Workshop.

Pakistan fully supports the aims, objectives and scheduling of the WASP Users Workshop and the proposed Regional Asian Project on Energy and Nuclear Power Planning within the Asian and Pacific Region. Pakistan's consent has been conveyed to the RCA Co-ordinator on 5th February, 1986.

HIGHLIGHTS OF INTERESTS

Following are the important interests which Pakistan would like to share with other RCA Member States:

- a) 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. PAEC may be enlisted as RCA Certifying Body for NDT Certification Scheme.
- b) Pakistan is installing a commercial gamma irradiator at Lahore with initial source strength of 200,000 curies for the sterilization of medical products with provision for irradiation of food products. We will be happy to share experience concerning on-the-job training with other Member States in the region.
- c) A programme on Material Science and Technology may be introduced in Phase II of the RCA/UNDP Industrial Project.
- d) A regional conference on Phase I of the UNDP Industrial Project may be arranged to discuss the achievements made so far and to utilize the experience during Phase II.
- e) Pakistan would like to request for the establishment of a Regional Nuclear Instrumentation and Control Centre in Pakistan with emphasis on applied aspects of nuclear instrumentation.

- f) 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 the Nuclear Institute for Agriculture and Biology (NIAB) at Faisalabad with other Member States. Pakistan reiterates its earlier proposal that NIAB Faisalabad may be regarded as a Regional Centre for RCA in the field of Agriculture and Biology.
- g) 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.
- h) Pakistan would be keen to host the activities already proposed in the Phase II of the UNDP Industrial Project, in the form of Executive Management Seminars, training courses, co-ordination meeting, etc.
- i) Pakistan supports the recently introduced sub-project of the UNDP Industrial Project on the "Use of Nuclear Techniques in Civil Engineering".
- j) Pakistan reiterates its earlier proposal that the RCA experts from among the Member States should be recruited after prior notice to each Member State so that a Member State can compete for such assignments. Emphasis should be on short-term (3 months) experts rather than long-term experts. Preference should be given to those Member States which have not held such assignments in the previous stages of the RCA.

Pakistan has great desire to further promote regional co-operation in peaceful uses of nuclear energy and, therefore, fully supports the RCA activities in the above fields. We hope that the RCA would also establish regional centres in those Member States where expertise exists but no such centres have so far been formed. This co-operation will benefit the regional countries and will help create uniform distribution of RCA facilities.

COUNTRY STATEMENT OF SRI LANKA
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Sri Lanka is very happy to host this 9th Working Group Meeting of the RCA and celebrate the 15th Anniversary of Regional Nuclear Co-operation. It is especially significant for us because it coincides with the Silver Jubilee of our own Atomic Energy Programme and the 30th Anniversary of the International Atomic Energy Agency. It is an accepted fact that Regional Co-operation in Nuclear Technology in this region has become stronger and stronger and now it is a very valuable programme significantly contributing in numerous ways to improve the quality of life of people for this region. It is important not only from a scientific point of view but in many other respects. The numerous training courses, research group meetings, specialist group discussions and RCA meetings have been held with people from different countries in the region together and this has built up close contacts and mutual understanding among them. This type of co-operation therefore will help to build up friendship among the nations and help to increase mutual understanding among the countries in our region. Such mutual understanding could lead to mutual assistance among the countries and to prevent misunderstandings, even political misunderstandings, which otherwise may lead to constrained neighbourly relations.

Sri Lanka has been a member of the RCA from its inception and participated in most projects carried out under the RCA umbrella. During the past year Sri Lanka hosted a two-week training course on "Human Tissue Sterilization by Radiation Processing" and a two-day Executive Management Seminar on "Industrial Radiation Sterilization of Medical Products". We held local training courses on Electronics for Technicians, Non-destructive Testing, Radiography and Ultrasonic Testing.

Sri Lanka sent trainees for the following UNDP/IAEA/RCA training courses:

1. Nucleonic control systems - Thailand
2. Industrial nucleonic instrumentation engineering - Japan
3. Industrial radiation sterilization of medical products - India
4. Non-destructive testing - Japan
5. Radiation curing of surface coating of wood products - Indonesia
6. Ultrasonic testing - China
6. Tracer technology in industry - India

UNDP/IAEA/RCA PROJECTS

1. INDUSTRIAL APPLICATIONS OF ISOTOPES AND RADIATION TECHNOLOGY

(a) Tracer Technology in Industry

Sri Lanka participated in the first UNDP/IAEA/RCA Executive Management Seminar on "Industrial Tracer Applications" held in Dhaka, Bangladesh in December 1986. An IAEA expert carried out a feasibility study on the use of tracer technology in Sri Lankan industries. His findings were that these techniques could be applied in many industries such as paper, agrochemicals, paint, rubber products, cement, gas, petroleum and water supply & drainage. Two engineers were trained on the tracer applications from the Ceylon Petroleum Corporation. The Authority arranged a seminar between the IAEA expert and the industrialists.

b) Non-Destructive Testing

Today 12 government and private sector industries are using the NDT methods. An NDT society was formed with a view to maintain the internationally accepted standards in Non-destructive

testing to promote the NDT methods. The National Co-ordinator attended the co-ordinators' meeting. Sri Lanka appointed a National Committee for training and certification of NDT personnel. A national training course in industrial radiography level 1 and 2 was held and nine trainees obtained the certificates. The first national training course in Ultrasonic testing-level 2 was held in February 1987. Ten NDT personnel were qualified.

c) Radiation Processing

A local seminar was held on the "Radiation Vulcanization of Natural Rubber Latex". A committee was formed to advise on research and development aspect of radiation processing of latex. Sri Lanka has produced several marketable rubber products not produced anywhere else by this method.

d) Nucleonic control systems

We have trained a number of engineers under this programme. However we have not yet engaged ourselves on the use of these systems.

2. MEDICAL AND BIOLOGICAL APPLICATIONS ON NUCLEAR TECHNIQUES

a) Sterilization of Biological Tissue Grafts

Sri Lanka hosted the training for the Asia and Pacific Region on "Radiation Sterilization of donor tissues" from 24th November to 5th December 1986. This was attended by a number of Sri Lankan surgeons and scientists. The tissue bank will be set-up in Sri Lanka with the collaboration of the International Eye Bank.

b) Quantitative Evaluation of Nuclear Medicine Imaging Procedures for the Diagnosis of Liver Diseases

This project is being carried-out in Sri Lanka. At present 25 clinical images of patients who were suspected of liver lesion were sent to Japanese authorities for final diagnosis. 119 clinical images were received from Japanese patients for evaluation. The standard liner phantom received in December 1986 from IAEA and the pictures were returned.

c) Quality Control Programme on Radioimmunoassay of Thyroid Related Hormones

With a view to optimize nuclear medicine procedures for the diagnosis and management of thyroid disorders this progress was launched in 1986. The IAEA initially will provide reagents for T_4 , T_3 and TSH test to be carried out. The quality control samples will be sent for a central laboratory for assessment.

d) Intercavitary Radiation Therapy

Cancer of the cervix and uterus constitute the largest number of cancer in females. A large number of cervical cancers are stage II or above and requires both brachytherapy and teletherapy. Presently the brachytherapy system is obsolete and used radium 226. In view of difficulties associated with manual handling of Radium it becomes difficult to handle the required number of patients. With the new Ralstron 120 B given by IAEA, Cobalt-60 will be used and this is a high intensity dosage system which means the treatment exposure time is short and a large number of patients could be treated.

3. ISOTOPE APPLICATIONS IN HYDROLOGY AND SEDIMENTOLOGY

The Atomic Energy Authority is carrying out a project in collaboration with the National Water Supply & Drainage Board and the Radioisotope Centre of the University of Colombo to estimate the direct recharge to groundwater and to identify recharge and discharge areas and the mode of recharge to the hard rock aquifer systems in certain low rainfall areas in Sri Lanka. These results are useful for the development of the groundwater resources in the country. Isotopes are also used to investigate the origin of salinity in groundwater in Southern part of Sri Lanka, which has now become a serious problem.

A laboratory for natural tritium analysis was set up in Sri Lanka under the RCA project on Nuclear Techniques in Hydrology and Sedimentology. The work initiated on fallout ¹³⁷Cs application in Soil redistribution studies under the RCA Programme, is in progress now in Sri Lanka.

4. MAINTENANCE OF NUCLEAR INSTRUMENTS

Under this project Sri Lanka received some of the maintenance equipment and expert assistance from the IAEA. Four laboratories using nuclear instruments in Sri Lanka benefited from the project. In 1986 a training course in Electronics for Technicians was conducted and 15 trainees qualified for certification.

5. ISOTOPES AND RADIATION TECHNOLOGY IN AGRICULTURE

- a) Use of Induced Mutations for Improvement of Grain Legume Production in South East Asia.

We have been taking part in the project on mutation breeding of grain legumes. We have obtained positive results from this project and in the future mutation breeding will not only

encompass rice, grain legumes and oil seeds but also root and rubber crops, fruits and vegetables using in-vitro cultures.

b) Use of Nuclear Techniques to Improve Domestic Buffalo
Production in Asia - Phase 2.

An improvement of domestic buffalo production using Nuclear Techniques has given us very useful results.

COUNTRY STATEMENT OF THAILAND
9th WORKING GROUP MEETING OF RCA-MEMBER STATES

COLOMBO, SRI LANKA

23rd March - 26th MARCH 1987

Mr. Chairman distinguished delegates, honorable guests, ladies and gentlemen,

It is my great pleasure to participate in this important meeting of the Ninth RCA Working Group, where opportunity for discussions, consultations, and decisions are made available again to all delegates from all Member States of the Regional Co-operative Agreement. In the past year, there have been number of achievements made by the Agency which deserve some deliberations and notes of gratitude and appreciation.

The Department of Technical Co-operation has proved its effectiveness and co-ordination flexibility with timely results on major issues such as the Third Extension of the Regional Co-operative Agreement, and the proposal of the UNDP Regional Industrial Project (RAS/86/073) for the second phase. In this connection, I would like to congratulate the Agency of its achievement in seeking approval from UNDP for the project RAS/86/073 particularly, to the RCA Co-ordinator for his outmost effort. Similarly, the third extension of the RCA is also likely to succeed and expected to be in force at due time this year. Furthermore, there has been some improved changes in administrative procedures which enhances the management for future RCA activities and new achievements.

The Government of Thailand is particularly pleased with such development and looking forward to render her full co-operation to the Agency.

The third extension of the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology has been carefully reviewed and studied. The Government of Thailand supports the extension and principle context of the revised agreement, but subject to formal approval in accordance with the final revised text coming out of this meeting. However, two observations were made as follows.

i) In view of the new text of the Agreement, there has not been any clear defined functions between RCA Working Group Meeting and Meeting of RCA Representatives. Therefore, appropriate and well co-ordinated functions of the two meetings should be discussed and decided upon, in accordance with paragraph 2 of Article II of the Agreement, such that their roles contribute to effectiveness and benefits to all parties concerned.

ii) The new text also contains well defined responsibilities among the Agency, donor countries, and the participating Member States. It is most welcome and believed to be more effective than before. However, care must be taken in co-ordination effort, particularly in the early years, so that reasonable responsibility be allocated to each participating Member States at well balanced between achievement requirements and effective co-operation.

New development has been made in Thailand on effort to commercialize food irradiation. On 18 November, Ministry of Health announced a revised ministerial regulation on irradiated food items permitted to be commercially produced and sold in market place. It is expected to provide wider scope for commercialization of food irradiation in Thailand. In this connection, the construction of a pilot-scale food irradiation facility is making good progress expecting to be operational by 1988. The facility will be owned and operated by the OAEP.

Various institutions in Thailand have involved in research and training activities under many RCA projects. With the exception of the UNDP Regional Industrial Project, all activities have been carried out through research contracts as summarized in Table I. Activities in Thailand under UNDP Regional Industrial Project have been carried out in terms of training, workshops, Executive Management Seminars (EMS), and expert missions, as summarized in Table II. Technical progress and developments of these projects are summarized in Annex I.

Some highlight achievements have been the successful development for embryo transfer in dairy cows, the use of radioimmunoassay in thyroid-related hormones, skill development for interpretation of diagnostic image of liver diseases and the substantial progress on market trail of irradiated onions and garlicks.

The importance of RCA has been well recognized. RCA has always brought us closer and help us learn and develop more of nuclear technology for the benefits of national and regional developments. Therefore, the Government of Thailand sincerely conveys to this meeting that she cordially invites all delegates here to the twelfth RCA Working Group in Bangkok in 1990.

Finally, on behalf of the Royal Thai Government, I wish to thank all donor countries for their kind contributions to sustain and enhance activities under RCA. Particularly for this meeting, I would like to sincerely thank the Sri Lanka Atomic Energy Authority for the facilities and hospitality rendered to us through out this meeting. Once again we are very much grateful to the Agency for all its continually supports from which RCA has progressed up to now and is progressing for the benefits of Asia and the Pacific Region.

Thank you Mr. Chairman.

Table I Summary of Research Contracts under RCA Activities in Thailand.
(Excluding Regional Industrial Projects)

| Project | Contract No. | Title | Principal Investigator | Research Grant(USD) |
|--|--------------|---|--|------------------------------|
| <u>Food and Agricultural</u> | | | | |
| 1. Regional Project on Food Irradiation (RPFI) Phase II | 4279/AG | The application of gamma irradiation for the extended commercial storage of root crops (onion and garlic) and shipping trials of irradiated frozen shrimp | Mr. Kovit Nouchpramool Biological Science Division Office of Atomic Energy for Peace (OAEF) | 1985 - 4,500 1986 - 4,500 |
| 2. Use of induced mutations for improvement of grain legume production | RAS/5/015 | The improvement of legume production by mutation breeding for Asia and the Pacific | Mr. Annart Chinchest Field Crops Research Centre, Chainat, Department of Agriculture Mr. Sumin Smutkupt Faculty of Science Kasetsart University | |
| | 3661/SD | Induced mutations by gamma irradiation for sorgham grain moulds and Roselle collar rot disease resistance | Mr. Sman Keoboonrueng Field Crops Research Institute, Department of Agriculture | 1983 - 2,500 1985 - 3,000 |

| Project | Contract No. | Title | Principal Investigator | Research Grant(USD) |
|--|--------------|--|--|--|
| 3. Semi-dwarf mutants for rice improvement | 2839/RB | The use of mutant stock for semi-dwarf plant type and early maturity as cross-breeding materials in rice | Dr. Ponchai Pookamana Rice Research Institute Department of Agriculture | 1981 - 3,000 1982 - 3,000 1983 - 4,000 1984 - 4,000 |
| 4. Nuclear Techniques to improve domestic buffalo production | 3873/RB | Determining the onset of puberty in swamp buffaloes under the breeding herd system | Mrs. Maneewan Kamonpatana Faculty of Veterinary Science, Chulalongkorn University | 1984 - 3,000 1985 - 3,000 |
| | 3872/RB | The influence of nutrition and patterns of suckling on postpartum cyclic activity in swamp buffaloes | Mr. Weerasak Wongsrikeao Faculty of Agriculture Khon Kaen University | 1984 - 5,000 1985 - 5,000 1986 - 5,000 |
| 5. Nuclear techniques for toxic elements in foodstuffs | 4266/RB | Application of neutron activation analysis to the determination of toxic elements in Thai foodstuffs | Mrs. Nowarat Leelhaphunt Waste Disposal Division Office of Atomic Energy for Peace | 1985 - 5,500 |
| <u>Medical and Biological</u> | | | | |
| 6. Improvement of cancer therapy | - | - | - | - |

| Project | Contract No. | Title | Principal Investigator | Research Grant(USD) |
|--|--------------|---|---|--|
| 7. Image procedure for the diagnosis of liver diseases | 4060/JN | Imaging procedure for the diagnosis of liver diseases | Dr. Sutee Na Songkhla Faculty of Medicine Siriraj Hospital, Mahidol University | 1985 - 3,900 1986 - 3,900 |
| 8. Development of Tc-99m generator system | 3413/RB | Development of Tc-99m generators using low power research reactor | Mr. Preecha Prakongvong Isotope Production Division Office of Atomic Energy for Peace | 1983 - 3,000 1984 - 3,000 1985 - 3,000 1986 - 3,000 |
| 9. Sterilization of biological tissue grafts | 3321/RB | Radiation sterilization of biological tissues for clinical use | Dr. Yongyudh Vajaradul Faculty of Medicine Siriraj Hospital, Mahidol University | 1986 - 5,000 |
| 10. Radioimmunoassay (RIA) | RAS/6/011 | Radioimmunoassay of Thyroid-related hormones for Asia and the Pacific | Dr. Makumkrong Posayachinda Faculty of Medicine Chulalongkorn University | |
| 11. Nuclear techniques for tropical parasitic diseases | 3617/RB | Techniques for the detection of parasite antigens in body fluid-solid phase RI for detection of malaria antigen-comparison between monoclonal and polyclonal antibodies | Mrs. Srisin Khusmith Faculty of Tropical Medicine Mahidol University | 1983 - 4,500 1985 - 5,500 |
| 12. Nuclear medicine | 3677/RB | Quality control procedures in nuclear medicine facilities in Thailand | Mrs. Anchali Krisanachinda Faculty of Medicine, Chulalongkorn University | 1983 - 4,700 1985 - 3,200 1986 - 3,000 |

| Project | Contract No. | Title | Principal Investigator | Research Grant (USD) |
|---|--------------|---|---|--|
| <u>General</u> | | | | |
| 13. Basic science using research reactor | - | - | - | - |
| 14. Maintenance of nuclear instruments | 2513/TC | A study within the framework of and RCA coordinated program on formulation and implementation of maintenance plans for nuclear laboratories in developing countries | Mr. Sirichai Keinmeesuke Electronic Instrumentation Division Office of Atomic Energy for Peace (OAEF) | 1979 - 6,000 1980 - 5,000 1982 - 5,000 1983 - 5,000 1985 - 3,500 |
| 15. Isotope applications in hydrology and sedimentology | - | - | - | - |

Table II Summary of Activities under PCA/UNDP Regional Industrial Project Phase I (1982-1986)

| Activities | Participation | | Remark |
|--|---------------|-------|--|
| | Foreign | Local | |
| <u>I. Tracer Technology</u> <u>Expert Service/Mission</u> 1. Prof. Anti Niemi 9 - 13 Dec. 1985 | - | - | -Met with Project National Counterpart and the Sub-Project Coordinator. -Visited a cement plant and discussed with PTT. |
| <u>II. Non-Destructive Testing</u> <u>National Training/Workshop/Seminar</u> 1. Seminar on Role of Non-Destructive Testing 5 - 6 Sep. 1983 | - | 197 | |
| 2. Seminar on the Use of Non-Destructive Testing in Building Construction 24 May 1984 | - | 105 | |
| 3. Training Course on Radiographic Testing Level I 17-20 Oct. 1985 | - | 21 | |
| 4. " " 18-22 June 1986 | - | 5 | |
| 5. " " Level II 12-26 Dec.1986 | - | 18 | |

| Activities | Participation | | Remark |
|--|---------------|-------|---|
| | Foreign | Local | |
| <u>Expert Service/Mission</u> 1. Mr. K. Ooka 12 - 26 Dec. 1986 | - | - | -Assisted on training content of syllabi, and practical training and exam for training on topic above. -held at Siam Kraft Paper Company. -Assisted local seminar on topic 2 above. |
| | 6 | 1 | |
| <u>Meeting</u> 1. Seventh NDT Expert Working Group Meeting 22 - 25 May 1984 | | | |
| <u>II. Radiation Processing</u> III a.1 <u>Rubber</u> - III a.2 <u>Wood</u> <u>National Training/Workshop/Seminar</u> 1. National Executive Management Seminar on Radiation Curing Technology 11 - 13 Dec. 1986 | - | 63 | |
| III a.3 <u>Wire and Cable</u> - | | | |

| Activities | Participation | | Remark |
|--|---------------|-------|--|
| | Foreign | Local | |
| <p><u>III b.1 Radiation Sterilization of Medical Products</u></p> <p><u>National Training/Workshop/Seminar</u></p> <p>1. National Executive Management Seminar on Industrial Radiation Sterilization of Medical Products 3 - 4 Feb. 1986</p> <p><u>Expert Service/Mission</u></p> <p>1. Dr. L.G. Gazso 24 Nov. - 4 Dec. 1986</p> | 1 | 40 | <p>-A participant from Malaysia attended.</p> <p>-Discussed with NCF and sub-project coordinator</p> <p>-visited medical supply companies and hospitals.</p> |
| <p><u>III b.2 Radiation Sterilization of Human Tissues</u></p> <p><u>Expert Service/Mission</u></p> <p>1. Dr. Triantafyllou 14 Sep. - 14 Oct. 1986</p> | - | - | <p>-worked with a research group on the subject .</p> <p>-Reviewed and recommended for development.</p> |
| <p><u>IV a Paper</u></p> <p><u>Regional Training/Workshop/Seminar</u></p> <p>1. First Training-Demonstration on the Use of NCSs in Paper Manufacture 15 - 26 Feb. 1982.</p> | 9 | 2 | |

| Activities | Participation | | Remark |
|--|---------------|-------|--|
| | Foreign | Local | |
| 2. Second Training-Demonstration on the Use of NCSS in Paper Manufacture 28 Mar. - 9 Apr. 1983 | 9 | 3 | |
| 3. Third Training-Demonstration on the Use of NCSS in Paper Industry 12 - 23 Mar. 1984 | 8 | 3 | |
| 4. Fourth Training-Demonstration Workshop on the Use of NCSS in Paper Industry 25 Feb. - 8 Mar. 1985 | 8 | 4 | |
| 5. Fifth Training-Demonstration Workshop on the Use of NCSS in Paper Industry 17 - 28 Feb. 1986. | 10 | 4 | |
| <u>National Training/Workshop/Seminar</u> | | | |
| 1. Executive Management Seminar on the Use of NCS for Paper Manufacture 27 - 28 Sep. 1984. | 11 | 7 | |
| 2. National Executive Management Seminar on Cost Reduction in Paper Manufacturing by Nuclear Techniques 4 Oct. 1985. | - | 58 | |
| IV b. <u>Steel</u> | | | |
| <u>Expert Service/Mission</u> | | | |
| 1. Dr. H. Amano and Mr. K. Masanobu 19 - 21 Nov. 1986 | - | - | -Visited past participants |
| IV c. <u>Mineral</u> | | | |
| <u>Expert Service/Mission</u> | | | |
| 1. Evaluation Mission : Dr. J. Watt and Dr. W. Whiten 25 July 1986 | - | - | -Visited past participants -Visited Dept. of Mining Engineering |

| Activities | Participation | | Remark |
|--|---------------|-------|--|
| | Foreign | Local | |
| <p><u>Y. Nucleonic Instrumentation Engineering (Nuclear Instruments Maintenance)</u></p> <p><u>National Training/Workshop/Seminar</u></p> <p>1. Technical Training Course on Maintenance of Nuclear Instruments 18 Jan. - 5 Feb. 1982.</p> | - | 22 | -joint activity with the Project on Maintenance of Nuclear Instruments. |
| <p><u>General</u></p> <p><u>Meeting</u></p> <p>1. Senior Board of Advisor 2 - 4 June 1983</p> <p>2. Evaluation Meeting of IAEA/UNDP Regional Industrial Project 16-21 Jan 1986</p> <p>3. National Counterparts Meeting 14 - 15 July 1986</p> <p>4. Fourth Tripartite Review Meeting 16 July 1986</p> <p><u>Expert Service/Mission</u></p> <p>1. Mr. E. Fowler 28 May - 1 June 1984 (Market Survey)</p> | 6 | 1 | -4 experts visited SKPC, Thai Ply Wood Company and met with NDT persons. -held at OAEP. -held at OAEP. |
| | 4 | - | |
| | 17 | 1 | |
| | 16 | 1 | |
| | - | - | -visited various companies relevant to the project. |

Summary of Activities under RCA Projects in Thailand

1. UNDP Regional Industrial Project Phase II

1.1 Tracer Technology

A field demonstration of tracer application to flow measurement of natural gas in pipe lines will be carried out during 1987-1988. The Office of Atomic Energy for Peace will be working jointly with Petroleum Authority of Thailand. The Agency will provide experts as per requests.

1.2 Non-Destructive Testing (NDT)

This subproject has been progressing slowly in Thailand, but some important achievements have been made. In 1986, two national training courses were organized by the Thai Society for Non-destructive Testing (TSNT) on Radiographic Testing, one for Level I and another for Level II. The project provided an expert to assist the training course for Level II, particularly on practical trainings and examinations. TSNT has given 31 diploma to NDT personnel in Thailand of which 27 were awarded to Level I trainees. Totally of four training courses will be organized in 1987 of which there will be one on Regional Training Course on Teach-the-Teacher for Radiographic Technique.

1.3 Radiation Technology

1.3.1 RVNRL: A National Research Group (NRG) will be formed in 1987 comprising researchers from OAEP, Department of Agriculture, universities and industry.

1.3.2 Radiation Curing

Department of Photographic Science and Printing Technology, Faculty of Science, Chulalongkorn University in Bangkok is proposing to avail itself for a regional training center on UV curing application to

printing and packaging industry under this project. There are also some interest on EB application to ply wood industry.

A national Executive Management Seminar on "Radiation Curing of Surface Coating" was held at CAEP during 11-13 December 1986. There were 57 persons attended the seminar.

1.3.3 Radiation Sterilization of Medical Products

A privately own gamma irradiator company, Gammatron Company Limited, is designated, by the Agency, to be a regional training center on the subject emphasizing on microbiological quality control of the radiation sterilized products. The training will be jointly conducted by OAEF and the company. The first training course is scheduled during 5-16 October 1987.

1.4 Nucleonic Control Systems

The fifth and last, under Phase I work plan, of the Training and Demonstration Workshop on the Use of Nucleonic Control System in Paper Industry was held at Mill Site of Siam Kraft Paper Company (SKPC) during 17 February - 1 March 1986. There was 13 participants from 9 countries. The trainings and demonstrations, and EMS's will be continue into Phase II. There will be two regional training and demonstration courses and three EMS in the course of five years period.

A national EMS on the Use of Nuclear Technique in Civil Engineering will be organized in Bangkok, tentatively, during 20-24 July 1987.

2. Food and Agriculture

2.1 Regional Project on Food Irradiation Phase II

The task is to study on extended commercial storage of irradiated onion and garlic in collaboration with onion and garlic traders. Ten tons of onions and four hundred kilograms of garlic were irradiated by gamma ray

and stored in low-temperature commercial warehouse. Market trial for the products was then carried out after 4-6 months storage period. Irradiated onions had better appearance, longer shelf life at ambient temp and satisfactorily accepted by consumers (no adverse comments were received). Market trial on irradiated garlies is being carried out which is expected to be completed by 1987. Irradiation proved to be beneficial for it completely inhibited sprouting of garlic after being stored for 8 months.

Research work will continue, and technology transfer to onions traders is progressing. Five hundred tons of onion will be irradiated, stored and market trial in 1987. The prospect is promising. Experiments on other products is in planning.

2.2 Nuclear techniques to improve domestic buffalo production

Earlier research results have led to successful embryo transfer and early pregnancy diagnosis in recent years. The success caught national attention as one of the most advanced achievements in locally developed Biotechnology. The technique has been incorporated in dairy production of Dairy Promotion Organization and Nong Po Daily Cooperatives Embryo Transfer Center.

New techniques are being developed to increase reproductive rate of swamp buffaloes at small farms. Research is being carried out in over one hundred villages.

2.3 Use of induced mutations for improvement of grain legume production

The research emphasize on mutation breeding of soybeans and mungbeans by using gamma radiation. Recent achievements has been the successful radiation induced mutations of rust resistance soybeen with same yield as the mother line. Field experiments are being carried on to obtain sufficient information for preliminary conclusions and for further developments. Progress

has been made in radiation induced mutation of mungbeans. More experiments are needed for meaningful conclusions.

3. Medical and Biological Applications of Nuclear Techniques

3.1 Imaging procedures for the diagnosis of liver diseases

The allocated tasks were carried out in three phases. Phase I, phase II and part of phase III have been reported in previous RCM's held in Seoul, Korea, and Lahore, Pakistan. Image from 116 patients have been interpreted, and the results were comparable to those of other participating countries. The work in phase III will be continued to cover 160 patients from images produced in all 6 participation countries. The results will be concluded at the next RCM scheduled to be held in Bangkok, Thailand, in October 1987.

Most problems arises from malfunctions and/or outdated machines in many of hospital facilities.

3.2 Radioimmunoassay of Thyroid Related Hormones (PAS/6/011)

The research work has been carried out in 7 assigned hospitals from 1 proposed hospitals. The results have proved to be very useful, and the demand is increasing. The Agency is requested to step-up assistance to include the remaining 8 hospitals in Thailand. Being at the early stage of the research and development, more assistance are needed for bulk reagents and equipment to accelerate the development of existing and future facilities. Future RCM to be held in Bangkok is welcome.

3.3 Quality Control of Nuclear Imaging Instruments

The Research activity involves routine operation checks and reference tests of various nuclear imaging instruments in 12 hospitals around the country. Advise, calibration and maintenance services are given at each routine visit.

Major problems are the lacking of calibrated sources (Cs-137), phantom for reference test and lack of guidelines for preventive and corrective maintenance. In connection with the latter, expert visits are requested.

3.4 Nuclear techniques for toxic elements in foodstuffs

Analytical techniques were developed in connection with neutron activation analysis. A base-line amount of toxic elements in vegetable was established. These trace elements are arsenic, cadmium, mercury, selenium, copper, zinc, and lead. Same set of trace elements will be analysed in other foodstuffs using the developed techniques. The research is expected to finish in 1989.

3.5 Technitium-99m generator system

The assigned topic is "Development of Tc-99m Generator Using Low Power Research Reactor". An optimum irradiation period was determined in order to minimize the size of extraction generator. Accordingly, a dry distillation equipment for separation of Tc-99m was designed and tested. Good progress was made, but further improvement is required. Solvent extraction generator was also developed. These equipment are currently used for Tc-99m production at OAEF. Future plan is to develop solvent extraction generator for distribution to hospital and develop a combined process of Tc-99m generator.

4. General

4.1 Maintenance of Nuclear Instruments

The recent achievements has been the development of computer software for preventive maintenance planning. However, some delay of work due to lack of components and qualified personnel are still problem. Therefore, the Agency is requested to provide more trainings on microprocessor-based

MCA, interfacing and trouble shooting on nuclear medicine equipment. Experts for specific problem solvings are also helpful. A regional center on nuclear instrumentation and training should be established.

Proposed Regional Asian Project

Title: Energy and Nuclear Power Planning within
the Asian and Pacific Region

Background:

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

By end of 1986 the Agency had transferred the WASP software package to 57 requesting countries and to six international organizations, and these recipients have used WASP in over 300 electric system expansion planning studies. Already the recently released MAED programme has been distributed to 10 requesting countries and one international organization. Many of these countries have participated in carrying out a comprehensive energy and nuclear power planning (ENPP) study. These studies, in which both WASP and MAED are used, consist of a detailed analysis of energy and electricity demand, and development of a least cost strategy for electricity supply. A key purpose of the studies is to determine the need and appropriate role for nuclear energy within the country's national energy plan. Based on such overall detailed planning studies, some countries have selected nuclear power as a component of their future electricity generation mix, 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 programme; Bangladesh has participated in the Agency's training course on WASP and has requested Agency assistance to implement the model during 1987. Thus, within the RCA region there is a widespread interest in the WASP methodology for economic planning of electricity generation systems.

Already three RCA countries (Indonesia, Malaysia and Thailand) have received MAED and many others have requested it. It is expected that most RCA countries would eventually participate in an ENPP study and thus would have a need to receive and use MAED.

General objectives: To promote exchange of information and to stimulate co-operation among WASP and MAED users so that the less experience users are assisted by the more experienced, with the aim of improving the planning capabilities and expertise in the use of WASP and MAED in the Asia and Pacific region.

Immediate objectives: The immediate objectives of the programme are:

- i) to exchange information on the implementation of WASP and MAED, including the proper selection of input data, and to compare WASP and MAED outputs obtained by various countries in the Region and interpret the results in terms of long-term planning of the electric power system including the role appropriate for nuclear power;
- ii) to discuss, and where appropriate, suggest modifications to adopt the models to the specific conditions in the Asia and Pacific region; and
- iii) to make available the updated WASP version in its personal computer (PC) mode, and thereby alleviate the problem of access to main frame computers which is a frequently encountered constraint to WASP usage in the least developed countries;

The objectives (i) and (ii) provide the opportunity to foster TCDC, as some RCA countries, viz IND, INS, MAL, and THA, already have considerable experience in operating WASP which others have not. Similarly, INS, MAL and THA already have considerable experience in operating MAED.

Situation at the successful completion of the project: Successful completion of the project will foster exchange of information and stimulate co-operation among WASP and MAED users as well as strengthen energy and electricity

planning in the participating countries. Furthermore, at the completion of the project, most RCA countries should have acquired experience with the updated version of WASP and with associated models such as MAED. The project should provide clearer insights into long-term energy supply options and the economic optimal share of nuclear power in each country.

Since this project will be conducted on a regional basis, it will be possible to rationalize the principal inputs and scenario assumptions, and hence directly compare the model outputs obtained by different countries. Generalizations on energy policy options throughout the region could therefore be studied.

On completion of the project no special assistance from the Agency or other sources would be expected.

Related technical projects and associated institutions

As indicated in the background, the current version of WASP has been distributed to most RCA Member States. The PC version has not yet been made available. Significant technical assistance in the WASP computer package and planning methodology has been provided to the following RCA countries: Bangladesh, China, Indonesia, Malaysia, Pakistan and Thailand. As regards the MAED methodology and the integrated planning approach to be followed in an ENPP study, significant technical assistance has already been provided to the following countries: Indonesia, Malaysia and Thailand.

Considerable assistance and experience could be provided by these countries during the project, thus aiding to promote an exchange of information so that the less experienced users are assisted by the more experienced.

Participants for the WASP workshop must have had prior experience with the model and be planners at electric utilities. Similarly, participants for the WASP/MAED workshops should be familiar with both MAED and WASP, but in any case thoroughly familiar with the energy and electricity situation in the country.

For carrying out the workshops, the Argonne National Laboratory (USA) will be involved in providing experts.

Work plan and project activities

1987 WASP Users Workshop to be funded separately

1988 (first year of programme implementation)

| | |
|---|-----------------|
| (a) WASP/MAED Workshop | \$20,000 |
| (b) 1 m/m Expert | \$ 8,000 |
| (c) provision of 4 personal computers and software | <u>\$52,000</u> |
| | <u>\$80,000</u> |

1989 (second year)

| | |
|---|-----------------|
| (a) WASP/MAED Workshop | \$20,000 |
| (b) 1 m/m Expert | \$ 8,000 |
| (c) provision of 4 personal computers and software | <u>\$52,000</u> |
| | <u>\$80,000</u> |

1990 (third year)

| | |
|---|-----------------|
| (a) WASP/MAED Workshop | \$25,000 |
| (b) 1 m/m Expert | <u>\$ 9,000</u> |
| (c) provision of 2 personal computers and software | <u>\$26,000</u> |
| | <u>\$60,000</u> |

**Regional Development of Radiation Sterilization Practices for
Tissue Grafts and Tissue Banking**

Background

For a number of years, the Agency, through the RCA, has supported a Co-ordinated Research Programme on Radiation Sterilization Practices for Tissue Grafts in Clinical Use in Asia and the Pacific. The aim of the programme is to build up the infrastructure and to promote the beneficial aspects of this radiation technology through a well conceived, regionally based work schedule. Activities have been undertaken in Bangladesh, Burma, India, Indonesia Pakistan, Philippines and Thailand.

A number of tissue materials have been studied including amnion, bone, skin, cartilage, nerves and facialata and experience in clinical applications is accumulating. As a result of this work, it has been clearly established that radiation is the most reliable and effective sterilizing agent.

As a consequence of this activity, the desirability of regional co-operation has become apparent. In advanced industrialized countries, the levels of investment and priorities in health care standards are different. Co-operation is already developing, for instance, between Thailand, the Philippines and Indonesia.

General aim:

The overall aim of the project is to contribute to the development of radiation sterilization practices for tissue grafts in the Region. There is a recognition by investigators in the field of the need to develop a protocol suited to regional conditions. The standardization of a protocol through inter-country co-operation should assist with the quality control of sterile grafts . The project will thereby promote a further application of high energy radiation to the improvement of health care standards.

Immediate objectives:

i) to build up the infrastructure in the field of Radiation Sterilization Human Tissue by

(a) training at various levels including technicians, surgical practice and research,

(b) development of protocols, and

(c) the provision of equipment to build up tissue banks;

ii) to support the indigenous production of clinically useable grafts recognizing the high cost and limited availability of imports;

iii) to support the development of nuclear techniques for the monitoring of grafts and their clinical applications. For example, the development of bone morphogenic protein essential for bone graft success is investigated using RIA and labelled monoclonal antibody techniques. Again, radioisotope techniques are used to measure membrane permeability.

iii) to develop protocols appropriate to regional conditions

iv) to promote regional co-operation through the dissemination of technical information and the provision of tissue graft material

Resources from the IAEA

i) Equipment: Some equipment can be made available to support the rational development of laboratory facilities for tissue irradiation and banking. Such facilities could include

- . small irradiators
- . freeze dry equipment
- . tissue procurement and handling equipment.

ii) Group training. An annual regional training course will be held

iii) Experts and fellowships. As far as possible the Agency will respond to requests from Member States.

Contributions from Member States

The following comments are not comprehensive but provide examples of how individual Member States can contribute to the programme.

Sri Lanka: The programme could be supported by the recently acquired irradiator and by the experience of the International Eye Bank. Since there is widespread public acceptance of the practice of donating tissues, Sri Lanka is a potential source of supply to the Region.

India: India could assist by providing technical help including irradiation services. It is a potential supplier, under contract, of small volume irradiators.

Thailand: Thailand could accept fellows from the Region and also provide some radiation processed graft samples to RCA countries.

Burma: Burma could contribute experience from an operational tissue bank.

Pakistan: Pakistan can co-operate in R and D. The country is leading the way by opting for amnion as a starting material for tissue grafts. A great deal can be achieved within the constraints on these activities in an Islamic country.

Bangladesh: Bangladesh can provide assistance in the R and D aspects of the activity.

Republic of Korea can co-operate in R and D activities.

Australia and Japan. The developed countries within the region can provide specialized training, and perhaps access to techniques and equipment not readily available elsewhere.

Work Plan

1988

- (a) The ongoing CRP on radiation sterilization of tissue grafts as an RCA activity should continue to promote region-specific data on tissue sterilization for safe clinical use and tissue banking in the RCA countries. This should improve technical data base and trained infrastructure concerned.
- (b) The next RCM on the CRP should be due in 1988, to be held possibly in Bangkok, Thailand or Manila, Philippines.
- (c) A TC regular budget supported group training course on tissue procurement, processing, radiation sterilization; on rehydration of sterile grafts for clinical use on patients; and on the use of radiotracers on graft clinical performance follow-up. A possible venue is the Bangkok Biomedical Materials Centre, Siriraj Hospital (Dr. Vajradul); to be held in 1988 or 1989.
- (d) In response to a TC assistance request in the field concerned, expert services/equipment/fellowship training should supplement active early implementation of tissue banking of radiation sterilized grafts in the RCA member States e.g. Philippines, Bangladesh, Pakistan, South Korea and China.

1989

- (a) Study tour of Eastern and Western European countries to tissue banks.
- (b) Similar programme of activities as in 1988 on tissue banking applications and atomic energy, to be repeated in the RCA region; in other Member States the hosting of a training course, if any; experts and fellowships in general for all Member States.

1990

- (a) Study tour of suitable host countries to tissue banking facilities.

Participants: Members of the tissue banking programmes of the Asia and Pacific region taking part in such study tours (if approved).

- (b) Research support within the framework of RCA/CRP and support of group and individual training through training course and fellowship programmes, provision of equipment, and inter-regional information dissemination/co-ordination for RCA countries.

Budget

1988

Research Co-ordination Meeting - funded through the regular budget administered by RI.

Regional Training Course - request for funding under Training Courses. Section allotment foreshadowed

| | |
|-------------------------|----------|
| Expert assistance: 3m/m | \$26,000 |
|-------------------------|----------|

| | |
|-----------|----------|
| Equipment | \$60,000 |
|-----------|----------|

1989

| | |
|----------------------------|----------|
| Study tour: 8 participants | \$50,000 |
|----------------------------|----------|

x 1 month to Europe

| | |
|------------------------|----------|
| Expert assistance 3m/m | \$28,000 |
|------------------------|----------|

| | |
|-----------------------------|----------|
| Individual fellowships 6m/m | \$18,000 |
|-----------------------------|----------|

1990

| | |
|--|----------|
| Study tour: tissue banks in RCA countries: | \$30,000 |
|--|----------|

| | |
|------------------------|----------|
| Expert Assistance 3m/m | \$29,000 |
|------------------------|----------|

| | |
|-----------------------------|----------|
| Individual fellowships 6m/m | \$20,000 |
|-----------------------------|----------|

P. Airey/te/0635S

Proposal for a co-ordinated research programme (CRP)
for RCA countries from 1988 to 1993

Project Officer: Y. Skoropad

1. The above-mentioned programme is planned to replace the existing CRP on "Improvement of cancer therapy in Asian countries by the combination treatment of conventional radiation and physical or chemical means" which will be terminated in November 1987.

2. The suggested CRP closely relates to the Agency TC project (EGY/6/004) on early detection and early treatment of carcinoma of the cervix. Contrary to the TC project, the philosophy of the CRP is to disseminate the scientifically modern methods of treatment for advanced carcinoma of the cervix which are not covered directly by the TC project and which present a great current problem for developing countries. Combination of the TC line with the CRP line might be regarded as a new promising trend in the Agency assistance to developing countries on controlling cancer diseases.

3. Proposed title of the programme

Improvement of radiotherapy for advanced carcinoma of the cervix in Asian countries through the application of a computer planning system.

4. Scientific background

Carcinoma of the cervix is one of the most common cancer diseases in developing countries. Usually, in 85-90% of cases patients come for treatment in advanced stage (II-B - III) of the disease. The treatment consists of the combination of intracavitary and external irradiation and in addition chemotherapy and sometimes surgery. The properly-planned treatment gives about 50% of the five-year cure rate even in stage III (for the stage II the figure will be much higher) while it does not exceed 10% or 15% when treatment is not adequate. One of the important pre-requisites of the successful treatment of advanced carcinoma of the cervix is to deliver prescribed dose of radiation to a tumour and, at the same time, to avoid overdosage and severe complications of bladder and rectum. To achieve this goal optimization of dose distribution from both intracavitary and external irradiations and adequate clinical skills are needed. By transferring modern treatment planning technology (through a personal computer and a suitable software) the efficiency of radiotherapy (in terms of cure and complications rates) in developing countries could be improved significantly and might be brought up to the level existing in industrialized countries.

5. Proposed programme goals

The goal of the CRP is to disseminate the modern treatment technology to developing countries and in such a way to contribute in improving results of the treatment for advanced cervix carcinoma and health care of the developing countries at the whole.

6. Outlining of the programme

The newly-proposed CRP is a clinical co-operative study on combined intracavitary and external radiotherapy of carcinoma of the cervix, stages II-B - III.

Usually, the whole pelvis gamma-irradiation in a 200 cGy daily dose is carried out up to a total dose of 4000-4500 cGy in 4.5 weeks followed by (with a two weeks' gap) ^{60}Co high dose rate (HDR) or low dose rate (LDR) intracavitary radiotherapy with a total dose of 2000-2400 cGy at point A. There are modifications of the protocol regarding fractionation, number and size of fields of irradiation, sequences of external and intracavitary irradiations, adjuvant treatment (chemotherapy), surgery, when it is possible, as well as treatment planning technique and dose specifications. All these matters are to be the subject of the discussion and agreement between the potential participants of the CRP.

Application of an agreed-upon treatment planning procedure and treatment protocol will give the unique opportunity to build up the common large clinical material within a short period of time and to make definitive conclusion on the effectiveness of the treatment. The results obtained could be compared to a historical clinical material of each participating country to demonstrate the change in cure and complication rates. The treatment protocol and treatment planning procedure might be disseminated to other big centres of developing countries and might serve as a basis for the further studies involving chemotherapy, surgery, hyperthermia, chemical sensitizers, etc.

7. Participating institutions

Eight RCA countries have informally accepted the idea of the new CRP at the fifteenth meeting of representatives of RCA member states on 2 October 1986. These are China, Indonesia, Japan, Republic of Korea, Malaysia, Pakistan, India and Thailand. The institutions and chief scientific investigators will be identified from each of the countries. It is assumed that each participating institution has got all necessary diagnostic and treatment (a HDR or a LDR intracavitary system, a teleradiotherapy machine (^{60}Co or a linear accelerator)) equipment and desirably a computer for treatment planning. In special cases it is planned to provide a country with an intracavitary irradiation system, personal computer with the software and training (Kuala Lumpur, Malaysia and Japan).

8. Duration of the programme

The programme is planned to be started in 1988 and continued for about five years. This time is required to build up enough clinical material with the period of follow-up of the patients treated being a minimum of two years.

9. Plan of actions on starting the CRP

- (i) Approval of the CRP and budget in principle.

April 1987.

- (ii) Dissemination of the proposal on the new CRP among RCA countries.

May 1987.

(iii) Collection:

- (a) Data on participating institutions, equipment, staff, patient load.
- (b) Need of equipment and training.
- (c) Suggestions on designing the protocol in details (selection of the patients, diagnosis, treatment planning and treatment procedure, follow-up, etc.).

May-September 1987.

- (iv) Summarizing of the data obtained and preparation of the preproject RCM on finalizing of the CRP.

January 1988.

- (v) Holding of the preproject RCM to finalize the new CRP.

February 1988.

- (vi) Supplying equipment and training.

March 1988.

- (vii) Starting the programme.

April-August 1988.

Estimated cost

| No. | Items | 1988 US \$ | 1989 US \$ | 1990 US \$ | 1991 US \$ | 1992 US \$ | 1993 US \$ | Sub-total US \$ |
|-----------|---|----------------------|----------------------|---------------|---------------|---------------|---------------|----------------------|
| 1. | Equipment for intracavitary irradiation (3 units or sets) | 50 000 <u>1/</u> | 100 000 <u>1/</u> | | | | | 150 000 |
| 2. | Expert services for radiation monitoring (1 m/m) | 2 400 <u>1/</u> | 8 000 <u>1/</u> | | | | | 10 400 |
| 3. | Personal computers and soft- wares (= 5 units) | 50 000 <u>1/</u> | 50 000 <u>1/</u> | | | | | 100 000 |
| 4. | Expert mission | 5 000 | | | | | | 5 000 |
| 5. | Research contracts (= 7) | 35 000 | 35 000 | 35 000 | 35 000 | 35 000 | | 175 000 |
| 6. | Research agreements (= 2) | | 2 000 | 2 000 | 2 000 | 2 000 | 2 000 | 10 000 |
| 7. | Research co-ordination meetings | 16 000 | | 16 000 | | 16 000 | 16 000 | 64 000 |
| Sub-total | | 158 400 <u>1/</u> | 195 000 <u>1/</u> | 53 000 | 37 000 | 53 000 | 18 000 | |
| Total | | | | | | | | 514 400 <u>2/</u> |

1/ The figures will be clarified after completion of the stage IV of the plan of action.

2/ Contribution of the Agency will be negotiated.

Monoclonal antibodies for immunoscintigraphy

(Suggestion for a RCA project for 1988)

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 eight 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.

Proposed programme

What is envisaged in this project initially is to identify a Japanese laboratory or institutes which can provide monoclonal antibodies for tumour imaging. The radionuclide for labelling the antibodies will be Indium (111In) which is cyclotron produced and should be supplied to the participants from a Japanese source.

Initially an Advisory Group Meeting should be held in early 1988 to identify the institutions and the scientists from Japan who would act as counterparts on this project. Selection of the appropriate antibody for trial will also be made by this group.

The project then will be handled by way of a Coordinated Research Project with about 8 participants from the RCA region. The participation can be expected from Japan, India, Pakistan, Thailand, Philippines, Bangladesh, China, Indonesia, Malaysia.

RCA proposal

Integrated Control of Tropical Plant Viruses with Nuclear Techniques

Project officer: N. MURATA

Background:

Plant diseases caused by viruses (and viroids) are prevalent in the tropics where (the vegetation and fauna are complex and) viruses and their insect vectors can survive all year round.

Take rice and legumes - both major crops in this region: (a) tungro virus, grassy stunt virus, ragged stunt virus, Penyakit merah, gall dwarf virus, yellow orange leaf virus, and transitory yellowing virus have been recognized as vicious pathogens of rice in Nepal, India, Indonesia, Malaysia and Thailand; (b) Soybean mosaic virus, tobacco ring spot virus, yellow mosaic virus, soybean dwarf virus, bean yellow mosaic virus, soybean yellow mosaic virus, cowpea mild mottle virus, peanut mottle virus, black eye cowpea mosaic virus, cowpea stunt virus, clitoria yellow vein virus, Indonesian soybean dwarf virus, peanut mottle virus, mungbean yellow mosaic virus, and black gram mottle virus, have been found to affect the various leguminous crops.

In fruit trees, papaya ring spot is causing severe damage in some locations while citrus tristeza virus is a rather global problem. Other vegetatively propagated crops such as sugar cane also have problems, mosaic virus, etc.

Many of the pathogenic agents have not been well characterized. Some of the viruses have strains with different virulence, some show different interference (mutual inhibition) behaviours, some may cause more severe symptoms by synergism of two or more viruses.

Viruses are primarily a complex of nucleic acids (mostly RNA in plant viruses) and proteins, their study therefore needs approach with molecular biological tools. These techniques (which utilize radioisotopes in some crucial steps) are not yet readily available in many developing countries. Recently further innovative techniques, again using radioisotopes, have been developed in countries with advanced technical

background: Identification of viruses with cDNA probes is one example. Cross protection using mutated viruses is also among new developments.

Full control of plant viruses needs integrated measures. Identification of virus free stocks production and cross protection must be advanced together with breeding of crops for resistance in which mutation induction may also play an important role.

Objectives:

Circumstances described above lead us to propose a regional research and development programme directed to problems in Asia and the Pacific region. The programme objective is to promote the technology transfer and co-operative research among developing countries in this region to improve the measures of integrated control of plant viruses including the use of nuclear techniques. Technology transfer will be undertaken by selective training, the provision of expert assistance and the support of appropriate fellowships. Components of the proposed research programme (subject to the adoption by the participating countries) may be as follows:

1. Identification of plant viruses and development of probes using nuclear techniques.

After purification and careful characterization of the viruses, efficient probes for their identification will be prepared. The major tools will be

- (1) monoclonal antibodies for ELISA tests, and
- (2) cDNA probes.

2. Assay of plant viruses with radioisotope-labelled probes.

The cDNA probes will be used for assaying the viruses in plant cells propagated in vitro or in vivo with or without inoculation. The technique will be applied to:

- (1) Cells in micropropagation, and
- (2) Populations of plants in the breeding programmes for improving virus resistance.

3. Cross protection.

Mild-virulence strains of viruses will be induced from local strains and efficient cross-protecting strains will be selected. They will be characterized carefully for "safe and efficient" use. The steps of studies will be:

- (1) induction of mild virulent strains,
- (2) characterization of mild strains (including sequence analysis) and
- (3) testing effectiveness in cross protection.

4. Mutation breeding for virus resistance.

Focussing on some specific crops, mutation breeding for virus resistance will be preformed. Special consideration will be given to the methods for:

- (1) Mutagenesis and handling of progenies
- (2) Screening for virus resistance.

Implementation: If approved, the project will be implemented through the Regional Co-operation Agreement.

RCA PROJECT TO ASSIST IN DEVELOPING MORE EFFECTIVE SOIL MANAGEMENT PRACTICES BY QUANTITATIVE ASSESSMENT OF SOIL EROSION & SEDIMENTATION.

Soil is one of the most valuable national treasures that every country possesses and therefore protecting this treasure by using most effective soil management practices is absolutely important. Up to now there was no technique available to measure soil erosion and sedimentation quantitatively and until significant damage is done to soil, erosion goes unnoticed. For the first time, a method has now become available to obtain quantitative estimates of soil erosion and sedimentation at levels which are far lower even to be noticed by any other technique.

The method is based on an understanding of the amount of Caesium-137 and its distribution in a soil profile. This radionuclide in soil is derived from atmospheric weapon testing programmes in the past. All modern (post 1955) surface soils are labelled with extremely low levels of Caesium-137 as a result of the fallout from weapon tests.

Studies carried out at the Australian Atomic Energy Commission have shown that soil loss (tonnes/hectare/year) due to erosion bears a high degree of correlation to the Caesium loss when the latter is compared with a stable site. This is of tremendous significance to Soil Scientists. Soil erosion which is a matter of expression or dispute thereby becomes rather a measured residual input of Caesium -137 by the use of this technique. In developing countries where soil loss data are fragmentary, if indeed it exists, the Radio Caesium technique should allow a ranking of soil losses and hence an ability to assess land use and land management practices. These measurements can also be used to identify erosion sources and sinks, study their spatial and temporal responses, provide real data on sediment loss and assist in the proper measurement of sediment delivery rates and the construction of sediment budgets for catchments of varying size.

Radio Caesium technique can provide a time integrated measure of soil losses since 1955. The ability to quantify soil losses, identify sediment sources and sinks and construct sediment budgets can be considered a significant achievement in soil science.

Application of the Radio Caesium technique in the determination of sedimentation rates in reservoirs and dams has been sufficiently developed by Australian workers to enable any country to use this technique in routine work. These results are not only of use to Engineers concerned with dam performances, but also to conservationists agriculturists and forest scientists as they are associated with problems within catchment areas.

Countries in the Asia and the Pacific Region are usually subject to tropical and monsoonal rainfall conditions with resulting difficulties in management of national soil resources. Introduction of this Radio Caesium Technique to these countries will bring about an invaluable contribution to the Soil Management in these countries.

Sri Lanka has already carried out a pilot project successfully and embarked on using the Radio Caesium Technique as a routine method in Soil Management. Several State run institutions including the Irrigation Department, Coconut Research Institute and Rubber Research Institute have already joined the Atomic Energy Authority to start work on this project and sites for the first phase of the project have already been selected.

Sri Lanka is pleased to propose the introduction of Radio Caesium technique to generate data necessary for developing more effective soil management practices in the Asia & the Pacific countries as a project under the RCA, as soil management is a common problem to all countries, particularly to countries which are subject to heavy monsoons and the use of this new found technique will enable the RCA countries to benefit through a new dimension in soil management.

Dr. Granville Dharmawardena,
SRI LANKA

REGIONAL TRAINING

| | | |
|----------------|---|--|
| Title | : | Training Course on the use of isotope in soil-plant studies with special emphasis on tree crops. |
| Duration | : | 6 week |
| Year | : | 1989 |
| Organizers | : | The International Atomic Energy Agency in cooperation with the Government of Malaysia. |
| Place | : | UTN with cooperation of UPM, UKM, MARDI, ERIM dan PORIM. |
| Participants | : | 20 participants |
| Countries | : | Asia - Pasific Regions |
| Objectives | : | <ol style="list-style-type: none"> 1. To create awareness on the use of isotopes as tracer in soil-plant relationship studies; 2. To familiarise researchers in the techniques of using isotopes to solve current problems such as fertilizer, efficiency, water requirement, role of cover crops in plantation and method of fertilizer applications; and 3. To introduce methods of fertilizer assesment using isotopes for tree crops studies. |
| Language | : | English |
| Input IAEA | : | <ol style="list-style-type: none"> 1. lecturers 2. air ticket and stipenā for participants & lecturers 3. Instrument (if necessary) 4. Announcement of program |
| Input Malaysia | : | <ol style="list-style-type: none"> 1. Venue 2. Lecturers 3. Field facilities 4. equipment and laboratory facilities. |



INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
ORGANISMO INTERNACIONAL DE ENERGIA ATOMICA

INTERNATIONAL LABORATORY
OF MARINE RADIOACTIVITY

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1987-03-02

The International Laboratory of Marine Radioactivity (ILMR) of the IAEA was established in 1961, well before the international agreement on sea waste dumping came into force and following the conclusion of a tripartite accord between the International Atomic Energy Agency (IAEA), the Government of Monaco and the Institut Oceanographique (Paris). Cooperation between the three groups continues with the adoption of a revised agreement with the Government of Monaco which was signed in 1986.

During the past three decades international interest has motivated the need to manage and nurture one of our most valued resources - the oceans. In spite of this growing recognition, however, it is only during the past decade or so that international agreement has been reached on the control of dumping of wastes (including nuclear wastes) at sea.

The Laboratory in Monaco exists:

- to assist Member States with regard to marine radioactivity and environmental problems by training of personnel, establishing co-ordinated research programmes and providing advice and assistance.
- to ensure the quality of the performance and comparability of studies of radioactive substances and other forms of pollution in the marine environment by national laboratories through interlaboratory comparisons, calibration and standardization of methodology; and
- to perform research on the occurrence and behaviour of radioactive substances and other forms of pollution in the marine environment;

The Laboratory proposes to join with countries through their chosen national laboratories in the Asian and Pacific Region in the conduct of efforts within the above subject areas.

RCA BUDGET AND BUDGET ESTIMATES

| No | Project/Activities | Source | 1986 \$K | 1987 \$K | 1988 \$K |
|----------------------------------|---|---|----------------------|--------------------------|--------------|
| UNDP Regional Industrial Project | | UNDP ⁽¹⁾ | 663 | 770 | 686 |
| | | Reg ⁽²⁾ | 69.8 | 77 | 85 |
| | | JPN ⁽³⁾ | 239.5 | 259.5 | (260) (5) |
| | | AUL ⁽⁴⁾ | 80.6 | tba* | |
| 2. | Nuclear Techniques to improve buffalo production | Reg | 71.6 | (75) | |
| 3. | Regional Project on food irradiation (phase II) | AUL | 80 | 80 | |
| 4. | Hydrology and Sedimentology | AUL | 9.7 | 65 | |
| 5. | Semi-dwarf mutants for rice improvement | Reg | 11.6 | | |
| 6. | Induced mutations for grain legume production | Reg | 18.8 | | |
| 7. | Imaging procedures for diagnosis of liver diseases | JPN | 115 ⁽⁶⁾ | (120) | (120) |
| 8. | Improvement of cancer therapy | JPN | 70 ⁽⁷⁾ | (129.9) | (130) |
| 9. | Regional Workshop "photon electron neutron dosimetry for radiotherapy | ROK ⁽⁸⁾ TC ⁽⁹⁾ | | 20 27 ⁽¹⁰⁾ | (20) (20) |
| 10. | Nuclear techniques for the diagnosis of Tropical parasitic diseases | Reg | 60 | | |
| 11. | Radioaerosol imaging for diagnosis respiratory diseases | IND ⁽¹¹⁾ | | (10) | (10) |
| | | Reg | | 50 | (50) |
| 12. | Tc-99m generator for low power reactors | Reg | 26.8 ⁽¹²⁾ | 24 | |
| 13. | Radiation sterilization of biological tissue grafts | Reg TACF ⁽¹³⁾ | 63 | 35 | (35) (88) |
| 14. | Radio immunoassay of thyroid hormones | TACF | 178 | 181 | 139 |
| 15. | Associated training courses ⁽¹⁴⁾ (RAS/6/011) | | | 70 | |
| 16. | Nuclear techniques for toxic elements in foodstuffs | Reg | 38.2 | 38 | (38) |
| 17. | Workshop on operation and maintenance of research reactors | IND | (20) | (40) ¹⁵ | (40) |
| 18. | Workshop on PC's for lab. automation | IND | (20) | | |
| 19. | Maintenance of nuclear instruments | Reg | 24.3 | (25) | (25) |
| 20. | Energy and nuclear power planning | TACF | | (20) | (80) |

*to be announced.

Notes

- 1) United Nations Development Programme.
- 2) IAEA Regular Budget.
- 3) Extra-Budgetary contribution from Japan.
- 4) Extra-budgetary contribution from Australia.
- 5) Funds in parenthesis are estimates only without government endorsement.
- 6) Includes allocation for Japanese contribution for training course.
- 7) Includes allocation for Japanese contribution to Project Committee Meeting.
- 8) Extra-budgetary contribution from the Republic of Korea.
- 9) Funded through the Department of Technical Co-operation.
- 10) Regional fund project.
- 11) Extra-budgetary contribution from Government of India.
- 12) Includes \$14,850 for technical contract.
- 13) Technical assistance and co-operation fund.
- 14) 1986 RTC "Production and use of bulk reagents for RIA of thyroid related hormones", Bangkok.

1987 Regional Training/Trainers Course on data processing in RIA.
- 15) Activities to be nominated by the Government of India.

REGIONAL COOPERATIVE AGREEMENT (RCA)

Ninth Working Group Meeting

23-26 March 1987

Closing Remarks by Deputy Director General, Noramly bin Muslim

Ladies and Gentlemen,

On behalf of the Director General and the delegates, I would like to thank Dr. Dharmawardena for his guidance and competence in bringing this meeting to a successful and fruitful conclusion. I would also like to take this opportunity to thank the Secretariat, i.e. the staff of the Sri Lankan Atomic Energy Authority, for their kind assistance in ensuring that our stay in Colombo was a memorable one. They have been working very hard, have been full of patience and have performed their duty well. Please also convey our thanks to your Government of the kind hospitality that has been shown to us. This includes the luncheons and dinners, cultural shows and also the opportunity to visit historical places which are the pride of Sri Lanka. The arrangements for the meeting were magnificent.

The Ninth Working Group Meeting of RCA is coming to a close. We have agreed and achieved a lot of things, including an agreement on our future work plan and programme implementation. I found that you all have been very co-operative, responsive and there was an air of seriousness shown by you to ensure the success of this programme. As I have mentioned earlier during the meeting, RCA is the pride of the Agency in Regional co-operation, a model in technical co-operation, and effort among developing countries. This is due to your serious participation, your earnest desire to co-operate, share and exchange experiences with your neighbours and your commitment to technology transfer.

With your unanimous agreement to the third extension of the RCA agreement, the second phase of the UNDP projects, the RCA regular projects and the research co-ordinated programme can be initiated. The Agency will make every effort to implement these projects effectively. Efforts are being made to strengthen our offices in Vienna and Jakarta. The success of these projects will depend on Member States. RCA is your effort and the Agency can only help and lead, the rest is up to the Member States.

The Agency would like to take this opportunity to thank the UNDP, the donor states like Australia, Japan, India and the Republic of Korea for their contributions. Our thanks to the Indonesian government for providing the infra-structure support in Jakarta. I have also noticed during the meeting that there were offers made by Member States to host meetings and training courses to place fellows, trainees and experts and there was a readiness to exchange materials and information. This is a good sign of international co-operation. The Agency thanks you for these offers and hopes that this spirit of co-operation will continue to grow and bring us closer together.

There are two items which are of importance to Member States which may not be directly related to RCA, but which do have national implications. I have mentioned these indirectly during our discussions. The first is training and the other is the two-year programme cycle. The recommendations made by the Board and the Senior Advisory Committee that in the near future emphasis will be given to Regional and National Training courses, fits in very nicely with the concept of Regional Co-operation. Interregional courses will still be maintained but mainly on programmes that cannot be carried out at Regional or National level. We are at present making a survey of the priority Member States place on subjects and types of training courses, so that we can advise the Agency when preparing future training courses. Please ensure that you respond to the documents that have been handed to you earlier this week.

Secondly, the two-year programme cycle which has been approved by the Board will effect the formulation of the technical assistance request for 1989-1990. An explanatory letter has been sent to Member States. Copies have also been distributed to you during the meeting. I hope Member States will take note of these changes as they are important steps for implementing effectively their programmes by the Agency.

I would also like to thank the People's Republic of China for its offer to host the next meeting of RCA in 1988. The exact date of the meeting and location will be determined later. We also take note of the offer of Australia to host the meeting in 1989 and Thailand in 1990.

Finally, I would like to thank you all for your participation in this fruitful meeting. Your positive and constructive comments on the RCA programme are much appreciated and we will take the necessary actions needed. I also would like to wish you a pleasant and safe journey home.

Thank you.