REGIONAL CO-OPERATIVE AGREEMENT

INTERNATIONAL ATOMIC ENERGY AGENCY

SIXTEENTH RCA WORKING GROUP MEETING

REPORT

Bali, Indonesia
22 - 25 March 1994

Revision: 12 August 1994

Country Statements

* Statement received from Japan after report printed.

The RCA Coordinator presented a draft fax for the Meeting's consideration and approval conveying their condolences at the news of the death of Shri R.G. Deshpande. The Meeting asked that this be sent to the Chairman of the Atomic Energy Commission, Dr. R. Chidambaran (**Annex 41**).

The RCA Coordinator proposed that the preparation of the paper for the 1995 NPT Review and Extension Conference should be made under the Chairmanship of Indonesia. Inputs from contributing Member States should be sent to the RCA Office by mid-May. The RCA Secretariat would collate them and prepare a summary with any additional supportive factual information that might be in their records. The format would be in-line with the previous submission. In consultation with the Indonesian Counterparts, a final draft would be prepared, which would be circulated to all RCA Member States with the Background Documents for the 1994 RCA General Conference Meeting. The Meeting agreed to the proposal.

Dr. Easey regretted that there was insufficient time for him to adequately review the analysis of the responses from the various RCA National Coordinators to the questionnaire on the recording of quantitative information on the RCA projects. Although there had been problems for some National Coordinators in providing the information required, the inputs from the respondents had been useful in providing information on the projects and also on the suitability of some of the questions in the questionnaire. He said that it was essential to persist with this task since everyone wanted to have projects with impact and it was therefore an imperative to have objective and quantitative indicators of impact. This logically translated into having base-line indicators at the start of the project which would be surveyed periodically to determine the incremental progress throughout the project's life and the total contribution at its end. He announced that there would be a follow-up EAGM on this topic the week before the General Conference to further refine the data recording exercise.

Japan made a statement concerning project performance which emphasized the vital role of the Agency's project officers/experts in assuring the success of the project, and requested the Agency to be very prudent in the process of assigning the officers/experts to a particular project. Special gratitude was expressed to those officers/experts who were in charge of the very successful cases in the past. The full text is given in Annex 42. Australia strongly supported the statement by Japan and noted that some of the Technical Officers would be difficult to replace because of their long experience, high level of technical skills and strong commitment to supporting RCA. It was noted that the RCA was well supported by dedicated Technical Officers. The Meeting determined that the report should minute that all delegates paid tribute to their invaluable contribution to the RCA programme's achievements, progress and success.

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16th RCA WORKING GROUP MEETING, BALI, INDONESIA

22-25 MARCH 1994

EXECUTIVE SUMMARY

The 16th RCA Working Group Meeting was held from 22-25 March 1994. It was attended by 51 participants from 14 RCA Member States. Only Mongolia was not represented. Singapore was present for the first time in many years. There were 24 participants from Indonesia. The IAEA delegation was led by Mr. Qian Jihui,, Deputy Director General, Department of Technical Co-operation. Dr. Djali Ahimsa, Director General, BATAN was elected Chairman for the Meeting.

The highlights of the Working Group Meeting were:

- the Meeting accepted and approved:
  - the draft RCA Annual Report 1993
  - the Action Plan for 1994
  - the Budget and Budget Estimates for 1994
  - the reviewed draft report for the 16th RCA Working Group Meeting.
- additional extrabudgetary support was announced from:
  - Indonesia who will give US$50,000 for the period 1994 to 1997
  - Republic of Korea who will consider giving US$30,000 to US$50,000 each year for 1994 to 1997 in addition to the training course it supports
  - Philippines who will continue to make a financial contribution.
- the Meeting strongly supported the Policy Review Seminar and endorsed the selection of topics. It was considered to be very important for Technical Co-operation projects to be formulated so that they would have an impact nationally or regionally.

. the Meeting recommended support for the following in the RCA programme:

- the proposals set out in the Project Formulation Meeting Report for Energy and Nuclear Power Planning with the component on the pooling and analysis of effective strategies for implementation of nuclear power programmes to be separated as a specific project;

- the proposals set out in the Project Formulation Meeting Report for Research Reactor Utilization and specifically the need for the evaluation of neutron radiography facilities in the region;

- the proposal for a CRP on Applied Research on Air Pollution using Nuclear Related Analytical Techniques;

- the proposal for an RCM in 1995 for Air Pollution and Lung function studies; and

. subject to agreement on detailed project activities:

- the proposal for a new project on Irradiated foods

- the proposal for a CRP on Agriculture Counter Measures

- the proposal for an RCA project on nuclear techniques for renal disorders.

The Meeting requested the Agency to support these and the current programme to the best of its ability, and to examine whether the current level of support for CRPs is commensurate with its obligations under the Articles of the Agreement.

Other matters discussed were:

. the Agency was requested to expedite the recruitment of the long-term experts for the joint UNDP/RCA/IAEA project RAS/92/073;

- the Meeting agreed to the submission of a factual background paper on RCA activities to the 1995 NPT Review and Extension Conference;

- the Meeting supported further initiatives that would maintain and secure at least the present level of extrabudgetary funding and the establishment of specific emphasis on those initiatives that would contribute to the UN "Women In Development Programme" and would also be relevant to the needs and priorities of RCA;

- the Meeting formally recorded its appreciation of the contribution of Dr. David Cook to the RCA programme on hearing of his resignation; and

- the Meeting sent condolences to India on the announcement of the sudden death of Shri R.G. Deshpande, who had been a long-time supporter and contributor to the RCA programme as an expert as well as a national counterpart.

Revision: 12 August 1994*

The RCA Coordinator presented a draft fax for the Meeting's consideration and approval conveying their condolences at the news of the death of Shri R.G. Deshpande. The Meeting asked that this be sent to the Chairman of the Atomic Energy Commission, Dr. R. Chidambaran (**Annex 41**).

The RCA Coordinator proposed that the preparation of the paper for the 1995 NPT Review and Extension Conference should be made under the Chairmanship of Indonesia. Inputs from contributing Member States should be sent to the RCA Office by mid-May. The RCA Secretariat would collate them and prepare a summary with any additional supportive factual information that might be in their records. The format would be in-line with the previous submission. In consultation with the Indonesian Counterparts, a final draft would be prepared, which would be circulated to all RCA Member States with the Background Documents for the 1994 RCA General Conference Meeting. The Meeting agreed to the proposal.

Dr. Easey regretted that there was insufficient time for him to adequately review the analysis of the responses from the various RCA National Coordinators to the questionnaire on the recording of quantitative information on the RCA projects. Although there had been problems for some National Coordinators in providing the information required, the inputs from the respondents had been useful in providing information on the projects and also on the suitability of some of the questions in the questionnaire. He said that it was essential to persist with this task since everyone wanted to have projects with impact and it was therefore an imperative to have objective and quantitative indicators of impact. This logically translated into having base-line indicators at the start of the project which would be surveyed periodically to determine the incremental progress throughout the project's life and the total contribution at its end. He announced that there would be a follow-up EAGM on this topic the week before the General Conference to further refine the data recording exercise.

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SIXTEENTH RCA WORKING GROUP MEETING
BALI, INDONESIA 22 - 25 MARCH 1994

The Sixteenth RCA Working Group Meeting was held at the Kartika Plaza Beach Hotel, Kuta, Bali, Indonesia 22-25 March 1994. It was attended by 51 participants from 14 RCA Member States (**Annex 1**). Only Mongolia was not represented. There were 24 participants from Indonesia. The IAEA delegation was led by Mr. Qian Jihui, Deputy Director General, Department of Technical Cooperation.

INAUGURAL SESSION

1. Report by the Organizing Committee

Dr. Widjang H. Sisworo, Chairman of the Organizing Committee, made a report on behalf of the Organizing Committee. He welcomed the delegates to Indonesia and to Bali and hoped that they would thoroughly enjoy their stay. The long distance between Kuta and Jakarta posed some administrative and logistic problems but he hoped that these would not give participants any concerns.

He gave a brief outline of the events that had been organized including the one day tour programme for Thursday 24 March 1994.

The full text of the speech is given in **Annex 2**.

2. Welcome Address on Behalf of the IAEA

In his welcome address on behalf of the IAEA, Mr. Qian Jihui, Deputy Director General, Department of Technical Cooperation commented on the maturing nature of RCA and its programme, and the need for Member States to make cash contributions to the programme. He also emphasized that, over the years, the programme had built up a wide range of expertise in the region and new experts needed to be utilized more in the regional programme.

He referred to the agenda item on the Policy Review Seminar and said he was waiting with interest to hear from the Member States on this issue. In concluding, he noted the expansion of the RCA membership with the notification by Myanmar of its desire to join and

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*) The numbering of the paragraphs in the report corresponds with the number of the Agenda item.

the preparations that New Zealand was making in order to make a similar application. The full text of Mr. Qian's address is given in **Annex 3**.

3. Welcome on Behalf of the Indonesian National Atomic Energy Agency (BATAN)

Dr. Djali Ahimsa, Director General BATAN, welcomed all the delegates to the Meeting and said that it was a great honour for Indonesia to be able to host an RCA Working Group Meeting for a second time; the first occasion being 1981 in Jakarta. He appreciated the selection of Indonesia as the venue of this 16th RCA Working Group Meeting. He thanked the IAEA and the past and present RCA Coordinators for their efforts in promoting RCA in the Asia Pacific region. It was now a model for other regions and had had very beneficial effects on the provision of nuclear science and technology for the Member States.

He referred to the success of the UNDP Industrial Project and emphasized the need for Agricultural projects within the RCA programme, citing examples of various successful ones from the past activities.

He noted that the recent inclusion of the new joint UNDP/RCA/IAEA project on the use of nuclear techniques for industrial applications and environmental conservation was a good extension of the programme. He said that he was concerned about the issue of public acceptance of nuclear techniques, especially nuclear power, and would like to see the RCA programme include this topic in the future.

He announced that Indonesia would like to make a special contribution of US$50,000 to RCA for the years 1994 to 1997. He welcomed the reopening of the regional office at CAIR, BATAN for the joint UNDP/RCA/IAEA project and the appointment and arrival of Professor Pham Duy Hien as the Chief Technical Officer.

He declared the Meeting open and wished everyone success with their deliberations. The full text of his speech is given in **Annex 4.**

FIRST ADMINISTRATIVE SESSION

The Interim Chairman, Dr. Carlito Aleta, thanked Member States for their support over the past year. He urged participants to act decisively on the various Agenda items and noted the very full programme before everyone. He said that the Philippines would continue to participate strongly in RCA and would also continue to make financial contributions.

He expressed his thanks to the Government of Indonesia for its hosting of the current Meeting and its good arrangements. The full text of his speech is given in **Annex 5**.

The Meeting stood for one minute in memory of Shri R.G. Deshpande who had died suddenly the previous week.

4. Election of Chairman

Malaysia nominated Dr. Djali Ahimsa, Director General BATAN as Chairman of the 16th RCA Working Group Meeting and this was seconded by Bangladesh. Dr. Ahimsa was unanimously elected Chairman.

Dr. Ahimsa thanked the Interim Chairman for his contribution to the Meeting and the participants for electing him Chairman. He hoped that all delegates would take full advantage of the opportunity to review and discuss the RCA programme.

5. Adoption of Agenda

The RCA Co-ordinator, Dr. Easey, reviewed the agenda items and brought to the Meeting's attention the change from the first draft agenda, with movement of the discussion of the Policy Review Seminar item from the last to the first day, so that Mr. Qian would be able to personally monitor the response of the delegates. He noted that the feedback from this RCA Working Group Meeting would input to the background paper for the Policy Review Seminar that would be prepared for a preparatory meeting in Vienna in May, prior to the June Board Meeting. The three major outputs were expected to relate to: radiation protection and waste management; medium-term country plans; and, the impact of Technical Cooperation projects.

The Meeting agreed to a proposal made by the RCA Coordinator that the RCA should submit a factual background paper on its activities to the 1995 NPT Review and Extension Conference, based on the precedent of the 1990 NPT Conference. It was noted that this was in accordance with the request for the IAEA to report on its contribution to technical cooperation over the previous five years under Article IV of the NPT. Australia, China, Indonesia, Japan, Republic of Korea, Malaysia and Viet Nam expressed support for this proposal. The Chairman asked the RCA Coordinator to advise on the content for the preparation of a draft paper.

The Agenda was then accepted without further modification **(Annex 6)**.

6. Draft RCA Annual Report, 1993

The RCA Coordinator, Dr. Easey, reviewed the need to maintain a dynamic approach to the RCA programme in order to maintain the current level of extrabudgetary support. He also emphasized the advantages of having properly designed, formulated and documented projects and the benefits derived from that, in terms of improved project management, monitoring and evaluation. He noted that every project in the 1993 TC programme had been documented in this way.

He pointed out that future extrabudgetary funding for RCA projects could be most effectively secured by aligning RCA needs with the known priorities of the donors and producing well-documented proposals. He cited the formulation of the current joint UNDP/RCA/IAEA projects as an example of this strategy and noted that this had encompassed two of the three UNDP priorities of Economic reform and Environmental and Natural Resource Management. He went on to point out that the third priority of UNDP, namely Human Development, contained two components Alleviation of Poverty and Women in Development (WID), and that WID imperatives were covered in three current RCA projects and one recently completed. He suggested that RCA should focus on support for WID now and in the future where there were suitable projects.

Dr. Easey reviewed the layout of the RCA Annual Report and its contents, and specifically commented on the budgetary information in it. He compared the funding of the RCA and Regional Asian projects with the other regions, noting the wide variation in the relative amounts of Agency and extrabudgetary financial support. He also noted the small contribution by the Agency to the RCA CRPs.

He outlined his concerns regarding the cost effectiveness of regional training and suggested that a better utilization of funds and increased benefits to national programmes might result from a uniform approach in upgrading various aspects.

He concluded with an appreciation of Shri R.G. Deshpande who had died suddenly the previous week and suggested that the Meeting send its condolences through a fax to the Indian Government. This was agreed unanimously. The full text is given in **Annex 7**.

Indonesia, Philippines and Japan endorsed the draft 1993 Annual Report, subject to some minor editorial corrections that would be reported to Dr. Easey separately. The delegates agreed to accept the draft 1993 RCA Annual Report.

7. Election of the Chairpersons for Project Committees

The results of the election were as follows:

a. Medical and Biological Applications of Nuclear Techniques.

Dr. Johan Masjhur
Head, Nuclear Medicine Department
Hasan Sadikin Hospital
Bandung

Nominated: Singapore
Seconded: Sri Lanka

b. Agricultural Projects.

Dr. Irawadi Djamaran
Deputy Chairman
The Agency for the Assessment and
Application of Technology (BPPT)
Jakarta

Nominated: Pakistan
Seconded: China

c. Research Reactor, Energy Based and General Projects.

Prof. Dr. Marsongkohadi
Director
Materials Science Research Centre
Jakarta

Nominated: India
Seconded: Thailand

d. Radiation Protection Projects.

Mr. Iyos R. Subki
Deputy Director General
BATAN
Jakarta

Nominated: Republic of Korea
Seconded: Japan

8. POLICY REVIEW SEMINAR

Dr. Easey referred to the briefing materials on the Policy Review Seminar which were presented in Annex 7 of the Background Documents. He emphasized that this was an important opportunity for the RCA Member States to record their views and make an input to this significant event. He said that the feedback from this RCA Meeting would contribute to the background papers that will be prepared for the Policy Review Meeting.

Mr. Qian emphasized the importance of the Policy Review Seminar. He reported that the February Board Meeting had defined the time and the duration of this Seminar which would take place Thursday 15 and Friday 16 September, immediately before the General Conference. He reported that there had been 25 written responses from Member States on the materials circulated and all the comments were very positive.

He said there was a great need to concentrate on the quality of the technical cooperation programme and develop new strategies with emphasis on impact. He noted that there would be intensive competition for financial resources in the future, not only for the IAEA securing international or donor funding, but also on a country level, for government funding for national nuclear research institutes.

He noted that many IAEA Member States had received aid and assistance for more than two decades and now should have sufficient infrastructure to take their accumulated skills and technology to end users outside of their nuclear institutes, and many were now doing this. The spread of the benefits to others was an imperative and projects needed to be producing more significant impacts. He said that the Secretariat needed to be more proactive in its approach and also to look at output management.

He commented that the Agency's Technical Cooperation activities were normally not widely known by the general public. The image of the IAEA was usually restricted to the safeguard operations and this needed to be corrected.

He said he would take the delegates' comments on the Policy Review Seminar back to the Secretariat and he expressed a hope that the feedback from the delegates to their experts would result in the seminar being well attended.

Indonesia said it fully supported the Policy Review Seminar and would comment on the three subjects to be addressed. Concerning the medium-term plan and technical assistance, appreciation was expressed for the Agency's dedicated efforts and assistance in technology transfer, and it was further stated that the technical cooperation programme had played a significant part in the national development of nuclear science and technology. It was noted that, while the Agency had significantly improved the efficiency of the TC programme, there was still the possibility of making the planning, management and evaluation aspects more efficient, and a systematic approach would assist in this. The Medium Term Plan was seen to be helpful in identifying key activities. It was emphasized by Indonesia that all their project proposals were reviewed by senior officials and were in-line with the five year Indonesian plan. It was hoped that the Medium Term Plan would not be used to interfere with these proposals. It was noted that the Agency did not include impact as part of its evaluation of projects and Indonesia requested that criteria be developed to evaluate projects in terms of the social and economic impact.

The priorities in Radiation Protection and Waste Management were reviewed. It was noted that the individual capabilities of Member States were quite different and that the approach to Waste Management needed to be carefully balanced. For Indonesia, it was mentioned that, for example, there were needs related to the provision of advice for the development of national infrastructure and to the coordination of methods for handling low and medium level radiation sources.

China emphasized the importance of public awareness and public acceptance to increase the acceptance and utilization of nuclear technology by the end users and cited the example of Food Irradiation as an illustration. It was also recommended that more case studies should be undertaken over a wide range of nuclear technology to assist in the promotion to the end users.

Malaysia commented that the move to take technology to the end users was the correct direction. It was also noted that there was now a need for management for results and more studies on the issue of national needs and impact should also be undertaken. It was pointed out by Malaysia that the commercialization of technology was now a requirement for many nuclear research institutes and this was an area where IAEA assistance would be very useful. The initiatives being covered by the Policy Review Seminar were seen to be appropriate and timely. It was also commented that there was a basic need to check whether countries had the infrastructure to carry out a programme detailed in any proposals.

Australia indicated strong support for the Policy Review Seminar and endorsed the selection of topics. It was hoped that as many Member States as possible would participate.

The Technical Cooperation Department was commended on its actions and especially the 'model projects' initiative. It was noted that the technical cooperation programme would need to respond to the real needs of a country and to global changes. It was also commented that there was going to be increasing importance placed on the need to compete for limited funds.

Bangladesh gave its support to the Policy Review Seminar and the topics selected for consideration.

India expressed its support for the Policy Review Seminar and commented that it was necessary to reinforce that projects had to have impact and this was more than 'doing good work'; it called for effective information dissemination. It was further suggested that an examination of a country's capacity to maintain and sustain a transferred technology should be made, since its absorption locally was critical in achieving self-reliance and self-sustainability. For the maximum benefits to be achieved, the technology needed to be further developed in that country.

Manpower development was seen to be an important continuing issue. In many instances, large numbers of people needed to be trained to enable a suitable core group to be formed. It was noted that significant numbers (70 to 80%) of those trained did not stay in this area of expertise and training in their institutes for an appreciable time.

Japan announced its support for the Policy Review Seminar and said it believed that it was indispensable to have and maintain an appropriate review process in any project so as to ensure efficiency and effectiveness.

Viet Nam said that it appreciated the initiative that had led to the establishment of the Policy Review Seminar and the opportunity for Member States to contribute to the debate.

Pakistan supported the Seminar and suggested that, in order to use its time more effectively, as emphasized by Mr. Qian, it would be better not to have presentation of individual country statements but rather have experts synthesize the comments, to more effectively bring out the combined responses.

Republic of Korea expressed support for the Seminar and thanked Mr. Qian for his explanations. It was also suggested that such seminars needed to be held more frequently. The eight year gap since the last one, was cited as being too long. Republic of Korea said that the concept of model projects should be stressed.

Philippines expressed support for the Policy Review Seminar.

In his concluding remarks, Mr. Qian urged Member States to make comments at the Seminar and illustrate them, where possible, using examples from their own experiences. There was a need to focus on operational aspects and analyze the issues. There would be many changes required to TC projects in order to have them directed to end users and it was also important to bring in government commitment, to ensure that a programme was viable at the national level. He said that links needed to be made between the Medium Term Plan and the national plans to determine what could be done practically. Infrastructure should not be ignored, since it could be crucial for development in some cases. He noted that action had been taken by both the Secretariat and the Member States to improve the projects and their implementation. He cited problems in the area of radiation protection, where many Governments did not have adequate infrastructure, to such an extent, that, in some cases, overseas trained specialists did not have a national position when they returned home.

Mr. Qian asked for suggestions and comments to be sent to him in writing. He was concerned with the efficient organization of the Seminar and wanted short presentations, which brought out good examples and were not just a recital of contributions.

FIRST TECHNICAL SESSION
REGIONAL INDUSTRIAL AND ENVIRONMENTAL PROJECT

Chairman: MR. DJALI AHIMSA
Director General, BATAN

Rapporteurs: MR. HENDRATNO
Senior Researcher, CAIR, BATAN

MRS. ELSJE L. SISWORO
Principal Research Scientist, CAIR, BATAN

9. Constitution of Project Committee

The Project Committee was constituted with Mr. Djali Ahimsa in the Chair.

10. Report on the 1993 Activities of the Joint UNDP/RCA/IAEA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development

Professor Pham Duy Hien, Chief Technical Officer for the project, reviewed its history and the 1993 activities. He noted that the late approval of UNDP finance in April 1993 had meant it had not been possible to fully implement the UNDP funded component. The two scheduled regional training events, the regional demonstration and the recruitment of the two long-term experts were the specific items that had to be rolled over to 1994. Nevertheless it had been possible to get most of the other activities carried out and over 60% of the budget for 1993 was spent.

He outlined the major activities with emphasis on the important role carried out by the National Coordinators at the four National Coordinator Meetings, where they fully defined the programmes for each of the five areas of technology.

Four regional training events were carried out during the year; two funded by Japan, through their special contribution to RCA, one funded by the Republic of Korea, and one funded by Australia. In addition national training events and expert assignments were carried out during the year.

Dr. Easey referred to Annex 2 in the Background Documents **(Annex 8)**, which contained all the briefing materials for this topic. He noted there was a new project proposal for a CRP on Applied Research on Air Pollution using Nuclear-related Analytical Techniques and asked the delegates for their comments. There was agreement that this should be supported.

There were statements from Member States on the need to get the two long-term experts recruited as soon as possible and Dr. Easey informed the Meeting that he hoped this would be done by May.

The importance of monitoring and correctly evaluating the project outputs was emphasized in discussions. Dr. Easey pointed out that it was essential to have a properly constructed system that could measure the impact of the projects. He briefly mentioned that the Expert Advisory Group Meeting on 'the Recording of Information on national activities an Contributions supporting RCA Projects' had produced a questionnaire which was distributed to National Coordinators at the end of 1993. It had not been possible to do an analysis of the

responses until recently and he hoped to report on this under the 'Other business' agenda item. He reminded delegates that this was the first time anyone had attempted this sort of data gathering exercise.

Mr. Qian commented on the need to ensure that the benefits from regional training were realized and asked the delegates to watch this particular issue. He also emphasized the need for securing the additional funding sources to replace the anticipated future reduction in UNDP funding.

11. Concluding Comments by Chairman

Dr. Ahimsa said that the session had been very interesting and had brought up a number of the important issues during the discussions. He noted the support for the CRP on air pollution studies. He agreed with Mr. Qian on the need to look for other funding sources and emphasized the need to have other projects defined with quantified outputs in the same way as the projects.

SECOND TECHNICAL SESSION
MEDICAL AND BIOLOGICAL APPLICATION OF NUCLEAR TECHNIQUES

Chairman:	DR. JOHAN MASJHUR Head of Nuclear Medicine Department Hasan Sadikin Hospital
Rapporteurs:	MR. SUHARTONO ZAHIR Director, Standardization and Radiation Safety Research Centre, Batan
	MRS. JENNY S. EDWARDLY Head, Technical Assistance and Cooperation, Programme Development Bureau, Batan

12. Constitution of Project Committee

The Project Committee was constituted with Dr. Johan Masjhur in the Chair.

13. Medical and Biological Technical Cooperation Projects

At the invitation of the Chairman, Dr. Easey outlined the different project activities undertaken during the year under this subject. The briefing materials were contained in Annex 3 of the Background Documents. Following the review, delegates were invited to comment.

13.1 Radioimmunoassay for Hepatitis B Diagnosis (**Annex 9**)

It was emphasized that this project was going ahead using technology from a developing country, China. The kits from China had been used effectively in the start of the project and now the emphasis was going to be on bulk reagents, again coming from China. Appreciation was expressed of the leading role that China was taking in this project which reflected the maturity of the RCA programme.

There were favorable comments on the project from Bangladesh, Vietnam, Pakistan, Sri Lanka, Thailand, Philippines, Japan, China and Mr. Qian. Mr. Qian said that the links between the Regional and National activities needed to be strengthened through stronger coordination. Contacts with agencies, such as WHO, would also maximize the impact and achievements.

Indonesia expressed its appreciation of this project's achievements and the benefits it was bringing in. They wanted to bring in four additional laboratories and requested autobead washers from the Agency to allow this expansion to take place. Indonesia also reported that a feasibility study on the local production of the Hepatitis B kits was to be started in 1994.

There was some discussion on the possible diagnosis of Hepatitis C but this was not considered viable at present. However, with a little more development, it could be ready in one to two years.

13.2 Radiation Sterilization of Tissue Grafts (**Annex 10**)

There was strong support for this project and China, Thailand, Republic of Korea, Indonesia, Vietnam, Sri Lanka all reported favourably on its impact. Mr. Qian commented that it was a very good project which was keeping pace with developments in Europe.

14. Medical and Biological Applications Coordinated Research Programme (CRP)

At the request of the Chairman, Dr. Easey reviewed the briefing materials contained in Annex 4 of the Background Documents. The Chairman then asked the delegates to give their opinions on the activities.

14.1 Imaging Procedures for the Diagnosis of Liver Disease (**Annex 11**)

Japan reported that the output from the CRP, an atlas, comparing the images from ultrasound and radiography, was now completed and was expected to be published by the summer of 1994.

14.2 Improvement of Cancer Therapy, Phase II (**Annex 12**)

Japan explained that the project was concentrating on cancer treatment with brachytherapy using software for improving the dose treatment planning. The CRP was expected to be completed soon.

Japan said that a consultant's meeting was scheduled for April/May and this would allow the results to be assessed.

Dr. Easey urged that this project be placed in a WID programme, if extension were recommended.

14.3 The Standardization of I-131 Treatment for Hyperthyroidism (**Annex 13**)

Dr. Easey reported that the CRP was approved recently and that the award of contracts are currently being evaluated.

15. Projects with TC and CRP Components

Dr. Easey reviewed the briefing materials in the Background Document.

15.1 Maintenance of Nuclear Instruments (**Annex 14**)

The complex nature of the activities in this project was reviewed and Mr. Qian talked about the benefits that might be achieved through the subproject on upgrading Analogue Gamma Camera. Indonesia said that this project was beneficial from the aspect of manpower development as well as the maintenance aspect. They reported that they would be establishing cooperation with a national private company for the maintenance of gamma cameras.

16. New Project Proposals (Annex 15)

The RCA Coordinator noted that there were two new project proposals in the Background Documents. The Chairman asked the delegates to express their opinions on these and also raise any other matters. The delegates were reminded that there was no specific funding set aside for these projects and that, if supported, funding would have to come from: deleting existing projects; secured extrabudgetary funds; or, proposing a footnote a/ project.

Indonesia said that renal failure was an acute problem in the region and suggested that there was a need to address this through a suitable project. This was strongly supported by a number of delegates. Dr. Easey said that the next stage should be the preparation of a specific proposal to be presented to the Working Group Meeting for evaluation and recommendation.

India emphasized that the proposal for 'Air pollution and lung function' only related to the provision of funds for a Research Coordination Meeting in 1995. The equipment, the BARC nebuliser, would be supplied free. The studies were required in order to get statistically significant data on the effects of air pollution on lung function. Bangladesh supported these comments and was joined by other delegates.

Japan inquired whether the proposal on audiovisual teaching aids could be funded as part of the Australian support to the general area of Open and Distance Learning. In reply it was pointed out that there were only funds available to support those activities specifically defined in the Australian project document. There was no formal support for this proposal from the delegates.

17. Concluding Comments by the Chairman

Dr. Masjhur thanked the delegates for their active participation in the session and commented on the very important topics that were being undertaken in this area. He noted the strong interest in the formulation of a project concerned with diagnosis of renal conditions and that a suitable proposal was now required. He also noted the support for the RCM on "Air pollution and lung function" and suggested that, since there was only a very modest financial support required, the Agency might favourably consider supporting this.

THIRD TECHNICAL SESSION
AGRICULTURAL PROJECTS

Chairman: DR. IRAWADI DJAMARAN
Deputy Chairman, Agency for the Assessment and Application of Technology (BPPT)

Rapporteurs: MRS. ELSJE L. SISWORO
Principal Research Scientist
CAIR, Batan

MR. HENDRATNO
Senior Researcher
CAIR, Batan

18. Constitution of the Project Committee

The Project Committee was constituted with Dr. Djamaran in the Chair.

19. Agricultural Technical Cooperation Projects and CRP Components

At the request of the Chairman, the RCA Coordinator reviewed the activities, indicating that the briefing materials were in Annex 4 of the Background Documents and that were six new project proposals.

Mr. Qian gave some additional information on problems with food security in Asia and Africa that had been brought to his attention by FAO. Although he recognized that it was the RCA Member States' privilege to make their own assessment of their priorities for the projects in the RCA programme, it seemed to him that agriculture was still a fundamental concern to the region, inspite of the strong emphasis on industrialization.

He said that there was a possibility that the Agency might provide funds to support agricultural projects but this would depend on how good and how relevant the project proposals were.

He mentioned that FAO was now adopting a multidisciplinary approach to solve problems in a more comprehensive manner. The various sections of the joint FAO/IAEA Division were now taking an integrated approach and trying to define the real problems and then design appropriate approaches to respond to them.

19.1 Food Irradiation Process control and Acceptance (RPFI III) **(Annex 16)**

This project terminated at the end of 1993. There was a consensus opinion that this had been an effective and useful project.

The Indonesian delegation recalled that a proposal had been expressed at the RCA Representatives Meeting, during the IAEA General Conference, in Vienna, September 1993, that Indonesia strongly supported the recommendations formulated at the final RCM of RPFI Phase II, Seoul, 20-24 September 1993. In line with the statement of Mr. Djali Ahimsa, the Director General of BATAN at the opening address of the 16th RCA Working Group Meeting, the Indonesian delegation proposed an extension of the Food Irradiation project with special emphasis on public acceptance.

19.2 Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen **(Annex 17)**

It was mentioned that this project would terminate in 1994 and that it is currently performing on schedule.

20. New Project Proposals (Annex 18)

There was a very strong body of support for an extension of the work in Food Irradiation as outlined in the proposal. Bangladesh, China, India, Indonesia, Republic of Korea, Pakistan, Philippines, Thailand and Vietnam all gave strong endorsement to this proposal. Many examples were given of the progress in this area to-date and this proposed extension was seen to be the vital link to any likely commercialization of Food Irradiation.

Mr. Qian made some observations on the Agency's experience in looking at the feasibility of setting up commercial facilities in China, Mexico, Morocco, and Chile.

The RCA Coordinator pointed out that the proposal, as it was presently formulated, was not explicit enough and he would contact the Technical Officer to have him expand the contents to explain how the performance of the project and its success could be measured. The modified proposal would then be sent to all the delegates for comments and, if they still supported it, the recommendation could go to the RCA General Conference Meeting in

September. Comments were also made by delegates on the need for professional non-scientific support in this project, because there was a large component of 'selling' involved. One suggestion was made that medical practitioners should be part of the team, since the general public consult them on any general health related concerns.

Japan said that although they ceased their financial support towards food irradiation at the completion of Phase I due to domestic reasons, they remained interested in considering in-kind co-operation to the limited aspects of receiving foreign trainees and sending experts, all on a case-by-case basis.

On the other project proposals, Induced Mutation Related Biotechnologies were supported by Bangladesh, Pakistan, China, Republic of Korea, Indonesia, Philippines, Sri Lanka and Thailand; Sterile Insect Techniques were supported by Bangladesh, China, Indonesia, Republic of Korea, Philippines, Thailand, Pakistan and Viet Nam; Rinderpest Seromonitoring was supported by Sri Lanka, Pakistan and Thailand; and, Increasing Crop Yields by Agroforestry by Viet Nam.

21. Concluding Comments by Chairperson

Dr. Djamaran emphasized the importance of agriculture to Asia and hoped that there would be good financial support. He said that many levels of support were requested and noted that the profit levels in much of this area were not attractive for commercial companies. He looked forward to receiving the revised project proposal for the recommended continuation of the Food Irradiation initiatives.

FOURTH TECHNICAL SESSION
RESEARCH REACTOR, ENERGY BASED AND GENERAL PROJECTS

Chairman: PROFESSOR DR. MARSONGKOHADI
Director, Materials Science Research Centre
Serpong, Batan

Rapporteurs: MR. BAKRI ARBIE
Director, Multipurpose Reactor Centre Serpong, Batan

DR. R.P.H. ISMUNTOYO
Director, Research Safety Technology Research Centre
Serpong, Batan

22. Constitution of Project Committee

The Project Committee was constituted with Professor Marsongkohadi in the Chair.

23. Research Reactor Technical Cooperation Projects

23.1 Research Reactor Utilization (**Annex 19**)

At the request of the Chairman, Dr. Easey reviewed the briefing materials set out in Annex 5 of the Background Documents. He also gave a review of Phase I and the Project Formulation Meeting for Phase II, which recommended that the major thrusts be through a TC project on Small Angle Neutron Scattering (SANS), a CRP on the design of inexpensive modular neutron diffraction equipment and an expert review of neutron radiography facilities in the region, to see whether a sufficient number have the intrinsic capability of producing commercial standard radiographs. There was support from the Member States for these proposals.

In other discussions India offered places to any interested Member States for the yearly Neutron Scattering School held at BARC.

Indonesia offered to host the 1995 regional training event on SANS. China and India detailed their current facilities and programmes in this area. Additional offers of present or future help were made by Bangladesh, Republic of Korea and Malaysia. Philippines said that they would have to send their scientists to Member States facilities to get the required experience. The need for continuous contact with the host country under such circumstances was emphasized by the Chairman.

Dr. Easey explained that the Project Formulation Meeting had determined that isotope production, neutron activation analysis and silicon transmutation doping were outside of the scope of this project.

24. Energy Based Technical Cooperation Projects

24.1 Energy and Nuclear Power Planning (**Annex 20**)

At the request of the Chairman, Dr. Easey reviewed the briefing materials set out in Annex 5 of the Background Documents. He reviewed the first phase and the results of the Project Formulation Meeting held in 1993, which recommended that the second phase should concentrate on two aspects: one, further improvement of forecasting, planning and analytical capabilities of the region through the use of the MAED, WASP and ENPEP methodologies; and the other, the pooling and analysis of information on effective strategies for successful implementation of nuclear power programmes.

There was very strong support by most Member States who agreed that there was a vital need to have more training in this area and to also address the problem of improving data input.

There was also support for the proposal on strategies for nuclear power programmes. On the suggestion from the RCA Coordinator, Member States agreed it would be better to have the two subjects in different projects and that a new project be started for this latter one.

25. New Project Proposals

As discussed in item 24 it was agreed to create a new project for the activities on strategies for nuclear power.

26. Concluding Comments by Chairman

The Chairman noted the strong support from most delegates on the Project Formulation Meeting recommendations for both projects. He viewed with satisfaction the interest of Member States in this area and the active way in which they had contributed to the discussions.

FIFTH TECHNICAL SESSION
RADIATION PROTECTION PROJECTS

Chairman: MR. IYOS R. SUBKI
Deputy Director General
BATAN

Rapporteurs: DR. SOFYAN YATIM
Director, Radioactive Waste Management
Serpong BATAN

MR. SUHARTONO ZAHIR
Director, Centre for Standardization and Radiation Safety Research

27. Constitution of Project Committee

The Project Committee was constituted with Mr. Subki in the Chair.

28. Radiation Protection Technical Cooperation Projects

28.1 Strengthening of Radiation Protection (**Annex 21**)

In his opening remarks the Chairman emphasized the importance of radiation protection to all the projects on the applications of nuclear technology. At the request of the Chairman, Dr. Easey reviewed the briefing materials in Annex 6 of the Background Documents. He also briefed the Meeting on the results of the 1992 Project Formulation Meeting and the Expert Advisory Group Meetings held in Beijing in 1993 and Melbourne in 1994.

Mr. Qian said he was in agreement with the views he had heard expressed on the importance of Radiation Protection as a pre-condition to the work on the applications of nuclear technology. Some of these views would also input the Policy Review Seminar. He outlined some of the dilemmas associated with inflexible rules illustrating with examples applicable to situations that might be encountered in radiation protection.

Japan briefed the Meeting on aspects of the radiation protection infrastructure project and the strategies adopted.

Australia commented on the importance they placed on radiation protection in the region and they regarded this as a successful project.

A number of Member States described their involvement in Regional and National events in this area. All Member States confirmed their support for all the five priority areas identified at the PFM and EAGMs.

In answer to a question on the setting of minimum standards for radiation safety, Mr. Qian explained that the situation was still being examined and there was a need to have some tailoring of the requirements to meet the local needs and uses of radioactive materials, and sources of ionizing radiation.

Japan outlined the three basic legal requirements of registering of sources:

- inspection and enforcement of regulations
- capability for assessing internal and external dose
- emergencies preparedness

29. Coordinated Research Programme (CRP)

29.1 Compilation of Anatomical, Physiological and Metabolic Characteristics of a Reference Asian Man (**Annex 22**)

The status of this CRP was reviewed. It was pointed out that the final RCM had taken place and a Consultants' Meeting was now planned for April to review the results and make recommendations on the need for any additional efforts. Should there be a positive recommendation, a Project Formulation Meeting would be held to prepare the design and management plan, which would be submitted to the next Working Group Meeting.

30. New Project Proposal

Japan noted that the project proposal on Agricultural counter measures, that had been part of the new project proposals in the Agricultural briefing materials, was more correctly a potential candidate for the radiation protection area.

It was agreed that the merit of the proposal needs to be assessed by the Member States. They will inform the RCA Coordinator of their interest by 1 May and, if there is sufficient support, the Agency Technical Officer will be requested to put together a far more detailed proposal showing outputs, activities and costs. This document will be circulated on 1 June.

31. Concluding Comments by Chairman

Mr. Subki noted the consistent commitment of the Member States to this radiation protection area and the high level of extrabudgetary funding supplied by Australia and Japan. He again repeated that all five components of the TC project had been endorsed by the Meeting and that a mechanism had been formalized, with consensus agreement, for dealing with new project proposals that needed to be recommended to the next RCA General Conference Meeting for endorsement. The proposal on Agricultural countermeasures would be dealt with in this way. In conclusion he thanked Mr. Qian and Dr. Easey for their assistance and the delegates for their cooperation.

COUNTRY STATEMENTS

32. Receipt of Country Statements (Annexes 23 to 37)

Dr. Easey reminded the delegates that, as well as submitting their written report, they could also make brief statements on matters of importance.

Malaysia offered to host the next Working Group Meeting in 1995.

SECOND ADMINISTRATIVE SESSION

Since Dr. Ahimsa was not able to Chair this session, Dr. Nazir Abdullah, Deputy Director General Batan took over as Chairman.

33. RCA Action Plan 1994 (Annex 38)

Dr. Easey reviewed the briefing material set out in Annex 7 of the Background Documents. After noting an error in the table, the Meeting endorsed the RCA Action Plan 1994.

34. RCA Budget and Budget Estimates for 1994 (Annex 39)

Dr. Easey reviewed the briefing materials set out in Annex 7 of the Background Documents. He emphasized that the amounts recorded as contributions from extrabudgetary sources were there as estimates only for planning purposes and did not imply commitment on the donors.

Japan wished it to be noted that it was not in a position to commit itself to a specific amount of contribution. Japan however would provide as much financial support as possible to RCA in 1994. From 1980 to 1993, Japan provided extrabudgetary contribution of about US$5,700,000 to the RCA activities.

Republic of Korea said that it fully recognized the importance of regional cooperation among the regional countries and it would establish the plan to contribute $30,000 to $50,000 per year for 1994 to 1997 to the RCA projects in addition to funding the existing RCA NDE regional training course. In line with this, discussions would take place with the RCA Coordinator to process the contribution in due course. The RCA Coordinator thanked them for this generous contribution and this was endorsed by the delegates.

Dr. Easey reiterated that Member States such as China, India and Republic of Korea, who fund training events but do not donate the money to the Agency for this purpose, only get the recognition of an 'in kind' contribution and, for the budget purposes, a notional figure of US$25,000 is set for each training event, which may not reflect the true costs.

Dr. Easey noted that the budget and budget estimate table would have to be up-dated to take account of the announcement by Indonesia of its extrabudgetary support of US$50,000 for 1994 to 1997 and Republic of Korea of their extrabudgetary support of US$30,000 to US$50,000 per year for 1994 to 1997. He added that this was a very generous and much appreciated gesture and he hoped that other Member States would follow this initiative by Indonesia and Republic of Korea.

The Meeting approved the budget and budget estimates for 1994 and Dr. Easey said he would include specific figures for the Agency funded CRPs when updating this table for the 1994 RCA Annual Report.

35. Other business

Australia, through the Secretariat, distributed a press release from ANSTO Board Chairman, Mr. Ralph Ward-Ambler, on the resignation of the Executive Director, Dr. David Cook.

Delegates expressed their regret at this news and asked the RCA Coordinator to formally convey a message to Dr. Cook from the Meeting stating their appreciation for his significant input and assistance to RCA during his time as National RCA Coordinator and to wish him well for the future (**Annex 40**).

The RCA Coordinator presented a draft fax for the Meeting's consideration and approval conveying their condolences at the news of the death of Shri R.G. Deshpande. The Meeting asked that this be sent to the Chairman of the Atomic Energy Commission, Dr. R. Chidambaran (**Annex 41**).

The RCA Coordinator proposed that the preparation of the paper for the 1995 NPT Review and Extension Conference should be made under the Chairmanship of Indonesia. Inputs from contributing Member States should be sent to the RCA Office by mid-May. The RCA Secretariat would collate them and prepare a summary with any additional supportive factual information that might be in their records. The format would be in-line with the previous submission. In consultation with the Indonesian Counterparts, a final draft would be prepared, which would be circulated to all RCA Member States with the Background Documents for the 1994 RCA General Conference Meeting. The Meeting agreed to the proposal.

Dr. Easey regretted that there was insufficient time for him to adequately review the analysis of the responses from the various RCA National Coordinators to the questionnaire on the recording of quantitative information on the RCA projects. Although there had been problems for some National Coordinators in providing the information required, the inputs from the respondents had been useful in providing information on the projects and also on the suitability of some of the questions in the questionnaire. He said that it was essential to persist with this task since everyone wanted to have projects with impact and it was therefore an imperative to have objective and quantitative indicators of impact. This logically translated into having base-line indicators at the start of the project which would be surveyed periodically to determine the incremental progress throughout the project's life and the total contribution at its end. He announced that there would be a follow-up EAGM on this topic the week before the General Conference to further refine the data recording exercise.

Japan made a statement concerning project performance. Australia strongly supported the statement by Japan and noted that some of the Technical Officers would be difficult to replace because of their long experience, high level of technical skills and strong commitment to supporting RCA. It was noted that the RCA was well supported by dedicated Technical Officers. The Meeting determined that the report should minute that all delegates paid tribute to their invaluable contribution to the RCA programme's achievements, progress and success.

Philippines asked whether it would be possible to improve the handling of the RCA documentation through the use of computer diskettes. Pakistan commented that there was too much information in the Background Document and that it might be beneficial to restrict the future contents to only essential information.

Dr. Easey replied that he would endeavour to make the production of a diskette with the background information a possibility for the next RCA Meeting. Concerning the volume of material, he agreed that this was so but was necessary to ensure that all delegates coming to the Meeting had the benefit of the same briefing materials. He noted that during the Meeting there had been a number of requests that the National RCA Coordinators should receive routinely information such as that on the regional training events. Implementing these measures would obviate the need to include this information in the background documents and would contribute to reducing the volume of information.

Professor Pham Duy Hien informed the Meeting that he intended to resume the production of a periodic newsletter on the joint UNDP/RCA/IAEA project at the Jakarta project office and this would be widely distributed.

Republic of Korea commented that the decreasing importance of agriculture to the RCA programme was disappointing and that, while there had been new project proposals from the Agency's Technical Officers from the joint FAO/IAEA Division, there also seemed to be a need for the region to also make suggestions on new projects and the use of new techniques.

Dr. Easey said that this request would be noted and that it would be necessary to bring together the region's agricultural specialists for a specific meeting on this subject to achieve proper representation of all the region's needs.

Australia expressed strong support of the process of open decision making that characterized the formulation of all the RCA projects.

The RCA Coordinator asked for delegates comments on the two page Meeting summary sheet he had distributed. He noted that in the past there had not been a written summary of the various conclusions and recommendations arrived at over the duration of the Meeting and the summary sheet had been produced to give the delegates an opportunity to assess whether such a document would be useful for them. There was general agreement that this would be a useful addition and should be included in the final report.

Malaysia reiterated that it would host the next Working Group Meeting and invited all delegates to attend.

CLOSING SESSION

36. Acceptance of Draft Documents

The draft report was distributed to delegates and was reviewed by the delegates on a line-by-line page-by-page basis. After editorial corrections, the report was accepted by the Meeting. The RCA Coordinator said that he would distribute the draft report at the earliest opportunity and requested that all corrections should be notified to him by 1 June to allow timely production and distribution of the final report.

37. Closing Remarks

37.1 IAEA

The RCA Coordinator spoke on behalf of Mr. Qian who had had to leave the Meeting to undertake other duties in Jakarta.

Dr. Easey expressed his appreciation for the hard work of the Meeting Secretariat that had enabled the very demanding tasks to be completed on time and resulted in the delegates being able to receive a full draft of the report for review. He thanked the Session Chairman and the Rapporteurs for their contributions to the smooth running of the sessions and the delegates for their strong positive contributions to the Meeting's discussions, which had enabled a full and frank review of the programme to take place.

On behalf of the delegates he thanked the Indonesian hosts for their generous support of the Meeting and the exceptional kindness and hospitality they had extended to all the foreign participants.

The Government of Indonesia was congratulated on its decision to become a cash donor to the RCA programme. Indonesia's long history of strong support to RCA, which included their support of the regional project office for more than 10 years, was cited as an example of their commitment to the fundamental principles of RCA.

The Government of the Republic of Korea was also congratulated on its decision to become a cash donor to RCA and their long-term commitment to RCA through their funding of Regional training events was gratefully acknowledged.

37.2 BATAN

On behalf of the Director General, BATAN, Dr. Djali Ahimsa, Dr. Nazir Abdullah extended sincere appreciation for the active contribution from all delegates. He said that the success of RCA was dependent on the collaboration and support extended by all Member States. This strong regional spirit coupled with the increasing financial support from the region were major factors for making RCA so successful. He acknowledged the special contribution from the Agency's Technical Officers and experts.

He noted that the RCA Agricultural programme should be enhanced and he hoped that the strong spirit for cooperation and collaboration which had been so clearly demonstrated during the Meeting would be strengthened and maintained in the future.

38. Official Closing

In closing the Meeting, Dr. Nazir Abdullah, Deputy Director General BATAN thanked all delegates for their cooperation and the Organizing Committee for its valuable contribution to the management and successful outcome of the Meeting. He wished everyone a safe homeward journey and declared the Meeting closed.

Annex 1

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Bali, Indonesia, 22 - 25 March 1994

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Annex 2

REPORT OF THE ORGANIZING COMMITTEE
AT THE OPENING OF THE SIXTEENTH RCA WORKING GROUP MEETING
BALI, INDONESIA, 22-25 MARCH 1994

Distinguished delegates and guests,

Good Morning!

On behalf of the Organizing Committee, and on my own behalf may I extend to you my sincere welcome to the 16th RCA Working Group Meeting.

It is also with a great pleasure that I welcome you to Bali island, which is called by the Indonesians 'Pulau Dewata' (the island of gods) and sometimes it is also called 'Pulau Sejuta Pura', the island of a million temples, on account of the fact that on this island you will find more temples than houses.

I am also very happy that we can realize the informal appeal which was raised by many delegates of the RCA Member States last year in the 15th RCA Working Group Meeting in Manila to hold the 16th RCA Working Group Meeting in Bali. But, since this meeting is carried out in a place which is far away from Batan's headquarters, I would like to beg you to be aware of our situation, and to apologize for any dissatisfaction you have had and will have concerning the preparation and execution of this meeting.

Based on a tentative agenda of the Meeting which has to be subject to the approval of the 16th RCA Working Group Meeting, it is planned that on the first and second day, the meeting will discuss technical matters pertaining to the implementation of last year's programme and the future programme of the RCA. The third day is free, it is usually used for a technical visit, but since there is no nuclear facility available on this island to be visited, the Organizing Committee in cooperation with Genta Bali Tour & Travel Service propose a no charge one day tour to replace the technical visit programme. This programme consists of a Barong dance performance, a visit to a typical Balinese house to understand the daily life of a Balinese family, a visit to the gold and silver works centre at Celuk, wood carving centres at Mas and a painting centre at Ubud.

We have also arranged a visit to a historical Hindu monastery at Goa Gajah, and to a holy spring for the Balinese Hindi at Tampaksiring village where the presidential palace is also located. You will have a buffet lunch at Kintamani, overlooking the beautiful scenery of Batur Valley and Batur Lake. You will also visit Gunung Kawi temple, one of the holiest temples

in Bali. It is not my intention to do promotion about the tourist industry in Bali but we wish you all to relax after having discussed scientific matters intensively over two days of meeting continuously. Please do not miss this programme. We hope the 16th RCA Working Group Meeting can be concluded on Friday afternoon, 25th of March.

The 16th RCA Working Group Meeting will be participated in by around 50 representatives of the fourteen RCA member states and International Atomic Energy Agency. It consists of 26 overseas participants and twenty-four participants from Indonesia. Until Friday last week the Organizing Committee has not received any information from the Sri Lankan delegate. But now I am glad that Dr. Dias is here. The Vietnamese delegate Dr. Nguyen Tien Nguyen has been replaced by Dr. Ngo Quang Huy. I am also very happy that the Vietnamese delegate has arrived in Bali before the opening of the meeting. The Mongolian delegate cancelled his trip which was earlier confirmed. It is for the first time that Singapore participates in the RCA Working Group Meeting. We are very pleased and welcome the participant Professor Aziz Nather to this meeting. It was with regret we have learnt that Dr. Deshpande from India died suddenly last week. He is replaced by Dr. Dasannacharya from BARC.

The Indonesian delegation consists of representatives from the Ministry of State for Research and Technology, the Agency for the Assessment and Application of Technology, the Nuclear Medicine Department of the Hasan Sadikin Hospital at Bandung and the National Atomic Energy Agency.

Distinguished delegates and guests,

On behalf of the Organizing Committee, I would like to take this opportunity to wish you all a happy stay and please enjoy the Balinese culture, food, and traditions, and hopefully this meeting will be successful and beneficial for the development of nuclear science and technology in the RCA Member States. Once again I would like to apologize for not satisfying you all concerning the arrangements of this meeting and please do not hesitate to contact the Organizing Committee for any problems you might have.

I thank you for your kind attention and cooperation.

Bali, March 22, 1994
Organizing Committee
Dr. Widjang H. Sisworo

Annex 3

SIXTEENTH RCA WORKING GROUP MEETING, BALI, INDONESIA, 22 - 25 MARCH 1994

ADDRESS OF WELCOME
BY
MR. QIAN JIHUI, DEPUTY DIRECTOR GENERAL, DEPARTMENT OF TECHNICAL CO-OPERATION

Mr. Djali Ahimsa, Director General BATAN
Distinguished Delegates, Colleagues, Ladies and Gentlemen.

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

The IAEA presents its compliments to the Government of the Indonesia and expresses its gratitude for agreeing to host this Working Group Meeting.

It is a pleasure for me to attend this sixteenth RCA Working Group Meeting here on the beautiful island of Bali. To me being here only serves to emphasize that this region is blessed with many resources from its natural beauty to the skill and enterprise of its citizens. In this region, we have seen continued strong growth for more than a decade and our newly industrializing countries are making significant impacts globally, as they demonstrate the high quality of their products and the efficiency of their industries. There has been a visible demonstration of our ability: to learn, and absorb new ideas and technologies; to adapt them to local needs and conditions; and, to be entrepreneurial with skills in the exploitation of the products of these new industries and technologies.

In the RCA programme I can see similar features. Our scientists and technologies have been showing a strong capacity to learn and absorb the technologies that are being transferred through the various projects. These technologies, too, are being adapted to meet local needs and conditions. Over the twenty two years that have marked the existence of the RCA programmes there has been a large investment in training and technology transfer, and many have benefitted. The pool of expertise has grown steadily and it is important to recognize this and to make the best use of this.

The RCA should be and is a maturing association where the roles and responsibilities of the individual members grows. There is a need for Member States to take more responsibility for mutual assistance in the programmes by providing increased levels of assistance to others and also to show this in a tangible form by becoming extrabudgetary donors to the programme. As I have said in previous RCA fora, I strongly believe that most RCA Member States have the resources and ability to make cash contributions to enable supplementation of the various activities that make up the basic structure for each project.

There is another side to the maturing process, as well, and this relates to making the maximum benefit of the pool of human resources that have been developed through the RCA and IAEA programmes. We now have a number of high qualified and well experienced scientists and technologists, and it is essential that this investment is used wisely. It should now be our aim to give this group more exposure in regional projects and allow them to repay their debts for the benefits they have been lucky enough to have received from our programmes. We should make every possible effort to use these people in regional and national training events as well as expert assignments. In the past UNDP Industrial project (RAS/86/073), I note that around 75% of the short-term experts came from the region and I would like to see this figure maintained or increased, particulary with also an increasing proportion of this effort coming from our developing countries. I will be taking an active interest in this aspect and I hope that you will all look critically into your requirements for expert assistance or expert lecturers and assist by identifying, recommending and accepting regional experts wherever they can be used.

Moving away now from specific to wider issues, I will be very interested to hear your views when we come to the Agenda item on the third Technical Co-operation Policy Review Seminar which will be held during the 38th regular session of the General Conference in September this year. As you will appreciate, the activities of the Technical Co-operation programme currently involve some 1100 projects in 80 countries and utilize around US$50 million.

As you know I have been very keen to ensure that the programme achieves as high standards as possible and that the projects undertaken are responsive to the real needs of the developing Member States. I believe that the initiatives undertaken within the "model project" concept have been very useful in achieving a sharp focus on such issues.

In the Policy Review Seminar there will be discussion on three key issues: radiation protection and waste management; medium-term country plans; and, the impact of technical co-operation projects. Your views from this RCA Meeting will be noted in the preparation of the background paper to go to the Preparatory Meeting in May before the Board Meeting. I am greatly interested in your opinions on this subject.

A final matter that I would like to bring to your attention is the issue of RCA Membership. On 9 March the Myanmar mission sent a note to the Director General, Dr. Blix, indicating their intention to become a signatory to RCA and I have been informed that the Government of New Zealand will shortly be making a similar request. By the middle of this year I see that our membership will have grown to 17, taking in almost all the Agency Member States in the Asia Pacific Region. This is a very welcome achievement and can only serve to further strengthen the ties and co-operation in the region.

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

Thank you.

Annex 4

SIXTEENTH RCA WORKING GROUP MEETING, 22 MARCH 1994

WELCOME ON BEHALF OF NATIONAL ATOMIC ENERGY AGENCY (BATAN)

Mr. Qian Jihui, DDG, Department of Technical Co-operation, IAEA
Dr. John Easey, RCA Co-ordinator, IAEA
Distinguished Delegates from RCA Member Countries
Ladies and Gentlemen,

May I first of all, on behalf of my government, and on behalf of the National Atomic Energy Agency (BATAN), warmly welcome you all to Indonesia, particularly to Bali for the 16th RCA Working Group Meeting.

It is a great honour to BATAN and myself indeed, to be with you this morning at the opening of this Working Group Meeting. As you know, there is a consensus among RCA Member Countries that the Working Group Meeting is held in member countries on a rotating basis. Now, Indonesia has its turn to host this important meeting for the second time, the first was in 1981 in Jakarta.

We are very pleased to host this Working Group Meeting in Bali, as Bali is not only a tourist attraction, but since the last years, it has become a desirable place for conferences, meetings, workshops, seminars of domestic as well as of a Regional or International nature for political, business and cultural purposes, as well as for scientific meetings.

I would like to express my deepest appreciation for selecting this place as the venue for this 16th RCA Working Group Meeting Committee. I hope that all the delegates will have a nice stay in Bali and enjoy the cultural life this island can offer.

Distinguished Delegates,
Ladies and Gentlemen,

May I use this opportunity to express our appreciation to the IAEA, in particular the RCA Co-ordinator and his predecessors, for their effort in promoting RCA activities in the region of Asia and Pacific. We believe, that RCA is an effective vehicle of regional co-operation and have become a model of co-operation for other regions within the IAEA Member States. Indonesia has been actively participating in almost all RCA programme, since the beginning of its establishment in 1972. More than two

decades has passed and RCA has proved to be an effective tool in joint co-operation in the region.

I am confident that all of us have benefitted through the RCA project, in using nuclear techniques to contribute to the development of our region. A decade of the UNDP/RCA/IAEA project on industrial application of isotope and radiation is already terminated. During this period we have learned and gained much from various programme activities. Innovation of nuclear technology in industry has become a reality although, many difficulties have been encountered. Close co-operation with the industrial sectors, Government as well as private owned industries is needed. We also believe that a strong industrial sector should be backed up by an established agricultural sector. In line with this it will be more appropriate if programme activities in agriculture will be enhanced.

The application of radioisotopes and radiation technology in agriculture in our region has been a success, such as mutation breeding, food preservation, improvement of cattle, food and many others.

Distinguished Delegates,
Ladies and Gentlemen,

A global issue raised at the end of the twentieth century is environmental problems and sustainable environment.

I am happy to see that the present UNDP/RCA/IAEA project will be directed to industrial issues to strengthen technology and support environmentally sustainable development.

RCA Member States with the wise guidance of the well experienced RCA Co-ordinator, Dr. John Easey, have succeeded in getting the project approval from the UNDP.

Distinguished Delegates,
Ladies and Gentlemen

I also would like to raise a particular issue at this meeting, that public acceptance will be the main constraint in the promotion of nuclear technology,

particularly in the promotion of a nuclear power programme. I would like to appeal that this issue be included in future RCA programmes.

A common issue in the implementation of a programme in general are financial constraints. In this connection Indonesia intends to take part in financing RCA programme with a donation of US$50,000 for the period 1994 - 1997.

We welcome the reopening of the UNDP/RCA/IAEA Regional Office at CAIR-BATAN as an "in-kind" contribution of Indonesia and warmly welcome Professor Pham Duy Hien as Project Officer. We will give him our full support and assistance.

Finally, before closing my welcome remarks, I wish you all an enjoyable stay in Indonesia and trust you will take the opportunity to get acquainted with our country, our cultural customs, our people and our way of life.

Herewith, I declare the 16th RCA Working Group Meeting officially open and I wish you every success in the deliberations during the Working Group Meeting.

Thank you.

Bali, 22 March 1994
Djali Ahimsa
Director General BATAN

Annex 5

STATEMENT OF INTERIM CHAIRMAN
16TH RCA WORKING GROUP MEETING
BALI, INDONESIA, 22 - 25 MARCH 1994

Distinguished delegates, ladies and gentlemen, a pleasant good morning to all.

It is with great pleasure that I act as Interim Chairman in today's Meeting. On behalf of the Philippine Government, I would like to thank Mr. Qian Jihui, IAEA Deputy Director General for Technical Cooperation, Dr. John Easey, the RCA Coordinator, all the delegates, and the various national coordinators for their support during the 15th Working Group Meeting held in Manila last year. The year seemed to pass very quickly and this is now the 16th Working Group Meeting. As in the past we are expected to act on the agenda before us, decisively, and deliberately.

It is noted that the agenda contains new project proposals and issues for a third policy review which this Meeting is supposed to deliberate on.

The Philippine Government has continued to support RCA activities in a modest way financially and through active participation in many of the activities as detailed in our Country Statement.

I would like to express my appreciation to the Indonesian authorities for hosting this year's Working Group Meeting. I am sure most of the delegates would not want to miss the opportunity of coming here to the very exotic island of Bali.

Thank you and good morning again. Can we all please rise for a one-minute silence in memory of Dr. R. Deshpande, a colleague of ours in these RCA Meetings.

I would now want to open the table for nomination of Chairman for this Meeting.

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Annex 6

A G E N D A

SIXTEENTH RCA WORKING GROUP MEETING
Bali, Indonesia, 22 - 25 March 1994

Tuesday, 22 March 1994

08:30 - 09:00 **REGISTRATION**

09:00 - 10:15 **INAUGURAL SESSION**

1. Report of the Organizing Committee by **Dr. Widjang H. Sisworo**
2. Welcome on behalf of IAEA by the Deputy Director General - Department of Technical Co-operation by **Mr. Qian Jihui**,
3. Welcome on behalf of National Atomic Energy Agency (Batan) by **Mr. Djali Ahimsa**, Director General

10:15 - 10:30 Coffee Break

10:30 - 12:30 **FIRST ADMINISTRATIVE SESSION**

Chairman: The Interim Chairman, **Dr. Carlito R. Aleta**, Director of Philippine Nuclear Research Institute

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

12:30 - 13:30 L u n c h

13:30 - 14:45 **FIRST TECHNICAL SESSION**

Regional Industrial and Environmental Project

9. Constitution of Project Committee

Chairman: **Mr. Djali Ahimsa**, Director General of Batan
Reporter: 1. **Mr. Hendratno**, Senior Researcher, CAIR, Batan
2. **Mrs. Elsje L. Sisworo**, Principal Research Scientist, CAIR, Batan

10. Report on 1993 activities on the Joint UNDP/RCA/IAEA Project on the Use of Iso-

topes and Radiation to Strengthen Technology and Support Sustainable Development
11. Concluding comments by Chairperson

14:45 - 15:00 Coffee Break

15:00 - 17:00 **SECOND TECHNICAL SESSION**

Medical and Biological Application of Nuclear Techniques

12. Constitution of Project Committee

Chairman: **Dr. Johan Masjhur**, Head of Nuclear Medicine Department, Hasan Sadikin Hospital, Bandung, Indonesia
Reporter: 1. **Mr. Suhartono Zahir**, Director of Standardization and Radiation Safety Research Centre, Batan
2. **Mrs. Jenny S. Edwardly**, Head of Technical Assistance and Cooperation, Programme Development Bureau, Batan

13. Technical Co-operation (TC) Projects
13.1 "Radioimmunoassay for Hepatitis B Diagnosis"
13.2 "Radiation Sterilization of Biological Tissue Graft"
14. Co-ordinated Research Program (CRP)
14.1 "Imaging Procedures for the Diagnosis of Liver Diseases" Phase II
14.2 "Improvement of Cancer Therapy" Phase II
14.3 "The Standardization of I-131 Treatment for Hyperthyroidsm with on Intent to Optimize Radiation Dose and Treatment Response"
15. Projects with TC and CRP Components
15.1 "Nuclear Instruments Maintenance"
16. New Project Proposals
17. Concluding Comments by Chairperson

19:30 - 22:00 Welcome dinner hosted by Director General of Batan and **Mrs. Djali Ahimsa**

Wednesday, 23 March 1994

09:00 - 10:30 **THIRD TECHNICAL SESSION**

Agricultural Projects

18. Constitution of the Project Committee

Chairman: **Dr. Irawadi Djamaran**, Deputy Chairman of The Agency for the Assessment and Application of Technology (BPPT)

Reporter: 1. **Mrs. Elsje L. Sisworo**, Principal Research Scientist, CAIR, Batan
2. **Mr. Hendratno**, Senior Researcher, CAIR, Batan

19. Technical Co-operation Project and CRP Components
    19.1 "Food Irradiation Process Control and Acceptance" (RPRI III)
    19.2 "Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen"
20. New Project Proposals
21. Concluding Comments by Chairperson

10:30 - 10:45 Coffee Break

10:45 - 12:30 **FOURTH TECHNICAL SESSION**

Research Reactor, Energy Based and General Projects

22. Constitution of the Project Committee

Chairman: **Prof. Dr. Marsongkohadi**, Director of Materials Science Research Centre
Reporter: 1. **Mr. Bakri Arbie**, Director of Multi Purpose Reactor Centre
2. **Dr. R.P.H. Ismuntoyo**, Director of Reactor Safety Technology Research Centre

23. Research Reactor Technical Co-operation Projects
    23.1 "Research Reactor Utilization"
24. Energy Based Technical Co-operation Projects
    24.1 "Energy and Nuclear Power Planning"
25. New Project Proposal
26. Concluding comments by Chairperson

12:30 - 13:30 L u n c h

13:30 - 15:00 **FIFTH TECHNICAL SESSION**

Radiation Protection Projects

27. Constitution of the Project Committee

Chairman: **Mr. Iyos R. Subki**, Deputy Director General of Batan
Reporter: 1. **Dr. Sofyan Yatim**, Director, Radioactive-Waste Management Technology Centre
2. **Mr. Suhartono Zahir**, Director, Centre for Standardization and Radiation Safety Research.

28. Technical Co-operation (TC) Projects
    28.1 Radiation Protection Infrastructures

29. Co-ordinated Research Programme (CRP)
    29.1 Reference Asia Man
30. New Project Proposals
31. Concluding comments by Chairperson

15:00 - 15:15 Coffee Break

15:15 - 17:00 **COUNTRY STATEMENTS**

32. Receipt of Country Statements

Chairman : **Dr. Nazir Abdullah**, Deputy Director General of Batan

Thursday, 24 March 1994

08:00 - 17:00 One day tour program (Barong Dance, Traditional Balinese House, Silver Handicraft, Wood Carving, and Painting Centre, GOA GAJAH - Hinduism Monastery, Tampak Siring Holy Spring, KEHEN Temple)

19.30 - 22.00 Farewell Dinner hosted by Dr. Nazir Abdullah, DDG of Batan and Mrs. Nazir Abdullah

Friday, 25 March 1994

09:30 - 10:45 **SECOND ADMINISTRATIVE SESSION**

Chairman : **Dr. Nazir Abdullah**

33. RCA Action Plan 1994
34. RCA Cost Projections 1994

10:45 - 11:00 Coffee Break

11:00 - 12:30 Break

12:30 - 13:30 L u n c h

13:30 - 14:30 Session continuation

35. Other business

14:30 - 14:45 Coffee Break

15:00 **CLOSING CEREMONY**

36. Acceptance of Draft Documents

37. Closing Remarks
    37.1 IAEA
    37.2 Batan
38. Official Closing by **Dr. Nazir Abdullah**, Deputy Director General of Batan

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Annex 7

COMMENTS ON RCA ANNUAL REPORT FOR 1993

by

Dr. J.F Easey, RCA Coordinator

Mr. Chairman, before dealing with specific items in the 1993 RCA Annual Report, I would like to review a few aspects of the RCA programme for the distinguished delegates consideration and subsequent discussion. As you all know, I am vitally concerned with the current status of the RCA programme and its future viability. With an eye of the future, I believe that there are a number of directions that should be considered to ensure a timely and smooth transitional process. The RCA is a dynamic programme and needs to move forward. The strategies and modalities used now, or in the past, may not be appropriate for the future and we need to be certain of our basic aims and objectives to ensure that we do not loose sight of the fundamental basis of RCA, which is for the Government Parties to 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.

It needs to be remembered the IAEA is not a signatory to regulatory of this agreement. Although the IAEA does provide the secretariat to coordinate the programme and is requested to assist with funding of activities, it is not responsible for fully supporting every aspect of the RCA programme. Since the Member States have the privilege of determining the total programme to be carried out under the Articles of the Agreement, they also should bear the responsibility for securing the funds to carry out the programme. The evolution of the RCA, since its inception in 1972, has indeed given us a present day situation where the major portion of the funding comes from extrabudgetary sources and it is now necessary to have part of the overall strategy for the future directed at modalities that will maintain or increase this extrabudgetory support.

Firstly, it is necessary to have projects that are attractive to the potential extrabudgetary donors. This broadly translates to projects that: address regional needs; are achievable in reasonable time scale; and have an impact wider than the limited needs of the individual national research institutes. However for the present and the future, we cannot proceed on the basis of broad statement of our intentions. The presentation of our plans in a clear and unequivocal style is essential, as is the need to quantify the benefit. This criteria are not some thing new for RCA. For example, in the proposal to UNDP for project support we have had to adopt these styles of presentation. It needs to be said that the preparation of projects proposal, within such formats, is not pedantic administrative exercise, on the contrary, it contributes substantially to achieving transparency in the basic project design and formulation, and clarity

in the project management, monitoring, and ultimate evaluation. It is for this reason that every Technical Project in the 1993 RCA TC programme was defined using such documentation.

What has been done in RCA, is very much in sympathy with Mr. Qian's initiative on model projects and his vision only serves to reinforce the case for increase our efforts, to ensure that the very best project formulation are produced. It is no longer enough to have 'good ideas', they have to be thoroughly and openly developed, documented and effectively packaged. Not only must we be smarter, we must be seen to be smarter.

The preparation and presentation of this documentation is also a crucial part of the process of securing extrabudgetory financial support. Potential donors will no longer considered projects for support unless they can be provided with convincing, well-structured and well-planed proposals.

As you all know, RCA has a very good record of achievement over a wide range of projects and has established itself as a credible and reliable vehicle for technology transfer and technical assistance in our region.

Mr. Chairman, for all I have set so far, one could be pardoned from wondering what else there was that RCA could do, since we appear to be so much 'on track'. The additional factor I would like us, to consider is the alignment of our priorities with those of the donors. In the formulation of our RCA projects we have free choice of topics and it is the consensus view that is adopted. If we are also going to formulate projects that are going to attract extrabudgetary funds, then we need to be selective, and where appropriate, concentrate on subjects known to be of interest and priority to donors. This does not infringe on our freedom of choice, rather it should be seen to be a mechanism for maximizing the viability of the RCA programme. We have already taken a step in this direction. When the initial discussions were being undertaken on the formulation of a project to follow the UNDP Industrial Project, we knew that the UNDP priorities for the fifth inter-country programme cycle (ICP-5) were: Human development; Economic reform; and Environmental and Natural Resource Management. Knowing this, we were able to construct a project proposal, based on the latter two priorities, that has now been refined into our joint UNDP/RCA/IAEA project, RAS/92/073, which is expected to have a total direct input of about US $7 million by the time it is completed.

We should now be on the look out for additional opportunities where it can be seen that our priorities and those of potential donors lie to the same area and could be aligned.

Returning to the priorities in the ICP-5, it is useful to examine the area of Human Development. There is a growing recognition of the importance of good health as a significant factor in human development, as well as in economic development, and, incidentally, many developed countries are now reassessing the role of preventive medicine and health care in their health programmes as an increasing share of costs are taken up in caring for the chronically sick and disabled. Let us examine what RCA is doing to make a contribution in the area of the application of nuclear technologies to health and medicine. There are three important projects currently being undertaken:

- Radiation Sterilization of Tissue Grafts
- Diagnosis of Hepatitis B
- Treatment of cancer of the cervix

and also one that was recently completed:

- Diagnosis of Thyroid Hormones

that I would like to bring to your attention, because, when analyzed, all have a major focus on Women In Development (WID). This topic and that of "the alleviation of poverty" make up the UNDP's programme in Human Development and specific funding is set aside to support initiatives within this area.

Within the UN system-wide medium-term plan for the advancement of women, 1996 to 2001 in Programme 3 on Human Resources Development and Subprogramme, 3.1 on Health, Nutrition, and Family Planning, there is a stated objective: quote for the strengthening of therapeutic services, programmes will be developed for the prevention, early detection and management of female cancers as well as other chronic health problems of women unquote. The organizations with primary responsibility for implementing this subprogramme include UNDP, WHO, World Bank and the IAEA. It is of interest that the IAEA itself does not have a WID policy.

In RCA, during the development of our technical programme, which has involved consensus agreement on the highest priority projects for the region, these projects with imperatives in WID have been supported and established on their merits. Because of the UN commitments to supporting WID, we should also focus on the contribution that RCA is making now and in the future, and clearly identify our contribution to, and, if possible secure additional support for this priority area.

Mr. Chairman, perhaps this topic might also be usefully brought up for discussion in the second technical session on Medical and Biological Applications of Nuclear Techniques.

The draft RCA Annual Report for 1993 has again been prepared so that most of the information concerning RCA is contained in this one document and it can be a ready reference.

1993 was a busy year with the start of the new joint UNDP/RCA/IAEA project and all the administrative and technical arrangements associated with it. Professor Pham Duy Hien has recently taken up his position as the Chief Technical Officer and I hope that the two long term experts, that will be taking up one year contracts, will be in place in May. More will be said about this in the First Technical Session.

Mr. Chairman, I would like to make some brief remarks concerning the present and future resources for support of the RCA programme. As is set out in the draft Annual Report, you will see, not only the budgets for the RCA programme but also those for the other regional agreements. The RCA extrabudgetary programme is 62% of the overall budget and this is some six to ten times the amount expected by the other two regional agreements. The wide variations in the IAEA support for the regional programmes and the regional agreements is also seen varying from Middle East and Europe which has no regional agreements and thus only has funds for their regional programme, to Asia Pacific, which has virtually no TC funds in the regional programme and a strong regional agreement.

Another aspect to consider is the support given by the Agency to the co-operative research. In the Articles of the current Agreement, the Agency is required to support this and "the development and training projects through Technical Assistance and its other programmes, subject to available resources". The support for research components does not come from TC, it comes from the Technical Departments through the Research Contract programme. In 1993 the

total CRP awards for the seven RCA CRPs were US $ 273,636 of which US US $ 237,152 came from extrabudgetary sources. Only US $ 36,484 (13%) come from the Technical Departments and all of this was from the Department of Research and Isotopes. It would be of interest to see whether the delegates think that this is an appropriate response.

As well as being concerned with achieving adequate technical and financial support for the RCA programme, I am also concerned that the financial resources utilized to conduct the programme are used in the most effective and efficient manner to achieve the various project goals. There are, I believe, many ways in which the Member States can assist in the achievement of cost- effective delivery for the various components of the programme and I would like to cite one example where your assistance could make a significant contribution.

Last year there were 21 Regional and RCA training events. The contribution of these events to the development of awareness and to technology transfer is very critically dependent on the individual participant. As you will all be aware, it is generally only possible to fund, on average, one person from each country for these events. Thus the benefit from such training is critically balanced on; how good the participant is; how much the participant is able to understand and willing to find out about the subject and related matters, and how much of all that has been presented to the participant ever gets back into the national programme. Because of the fragility of these linkages, I believe we should carefully examine the situation and have an agreed approach to ensure that the maximum benefits can be achieve and, if there are shortcomings, they are recognized. Amongst other things, I think we need to examine: how to get the best and most appropriate candidates nominated; how to ensure that they obtain the maximum from the training; and how this is transferred to their national programmes to ensure maximum national benefit. On this last point for example, should it be mandatory for every training course participant to submit a report, through his head of Institute, to the National RCA Coordinator within 3 months of attending any regional event. Such a report could contain: a review and comments on the training; and what the participant had done nationally to pass on what had been presented. Your views are essential if we are to have a concerted approach on this.

Finally Mr. Chairman, all the delegates here have heard the sad news that Shri R. G. Deshpande has suddenly died after a short illness. He has made significant contributions to RCA over his long years of association with the programme. He participated in numerous consultants and experts meeting, particularly in his speciality area of Radiation Technology; acted as Training

Course lecture; undertook expert assignments; and often participated as part of the Indian delegation to the RCA Working Group and General Conference Meeting. He was always a strong supporter and contributor to RCA and the strength of the Indian extrabudgetary contribution over such a sustained period owes much to his involvement and commitment. With your permission I would like to send a fax to India from this meeting conveying our condolences at such a loss and expressing our appreciation for all he contributed to RCA.

Thank you.

Annex 8

INDUSTRIAL AND ENVIRONMENTAL APPLICATIONS

- Extract from National Co-ordinators Meeting on Nuclear Analytical Techniques, Kuala Lumpur, 22-25 June 1993.

- Extract from National Co-ordinators Meeting on Nuclear Control Systems and Tracer Technology, Sydney, 6-8 July 1993

- Extract from National Co-ordinators Meeting on Non-Destructive Evaluation, Tokyo, 30 August to 2 September 1993.

- Extract from National Co-ordinators Meeting on Radiation Technology, Takasaki, 4-8 September 1993

- Regional Training Course on "Environmental Applications of Radiation Technology (Basics)"

- Regional Training Course on "Radiation Technology for Environmental Conservation"

- Regional Workshop on "Radiation Processing - the Economic Benefits"

- Regional Training Course on "Industrial Application of Non-Destructive Testing and Evaluation"

- Regional Training Course on "The Application of Modern Isotope Techniques to Industry"

- New Project Proposals

  - Applied Research on Air Pollution Using Nuclear Related Analytical Techniques

JOINT UNDP/RCA/IAEA PROJECT RAS/92/073

FIRST MEETING OF NATIONAL CO-ORDINATORS FOR NUCLEAR ANALYTICAL TECHNIQUES,

Kompleks PUSPATI, Bangi, Malaysia
22-25 June 1993

1. OPENING SESSION

Dr. John F. Easey, RCA Co-ordinator, IAEA welcomed the participants to the Meeting and thanked the Malaysian Government for agreeing to host the event. He expressed his appreciation for the efforts of the Nuclear Energy Unit (UTN) organizing committee which had resulted in a very well organized and efficient start to the Meeting. He noted that this was both the first of the meetings for the various National Co-ordinators for the new joint UNDP/RCA/IAEA project on Environmentally Sustainable Development and also the first time that Nuclear Analytical Techniques had been a specific technology addressed within the RCA programme.

Y. Bhg. Dr. Ahmad Sobri Hj Hashim, Director General, UTN welcomed the participants and said it was a privilege to have this Meeting in Malaysia. He reviewed Malaysia's participation in the former UNDP Industrial project and announced that Malaysia would be fully participating in this new joint UNDP/RCA/IAEA project. In addition he announced that Malaysia would be contributing US$50,000 for project activities over the life of project, 1993 to 1996. He reviewed the Nuclear Analytical Techniques emphasizing their advantages and also touched on the aims and objectives of the Meeting. In conclusion the hope was expressed that there would be a productive and successful Meeting. The full text of his speech is given in Annex 1.

The participants and observers then introduced themselves to the Meeting. There were thirteen National Co-ordinators from the RCA Member States, only Singapore and Japan were not represented. There was one observer from the Republic of Korea and five from Malaysia. The full list of participants and observers is given in Annex 2.

Dr. Pier Danesi, IAEA, Director, Seibersdorf Laboratory was elected Chairman for the Session and the programme adopted was that set out in the previously circulated draft agenda (Annex 3).

Dr. Easey gave a presentation outlining the RCA programme of activities, the results of the previous UNDP Industrial Project and the development of the present joint UNDP/RCA/IAEA project (copies of the overhead transparencies used are given in Annex 4). He then went through the parts of the approved Project Document (Annex 5) relevant to Nuclear Analytical Techniques including the activities required for the stated output, the budget and the time-tabling of the events. He explained that the role for the National Co-ordinators at this Meeting was to determine the detailed nature for these various activities in line with the consensus view on the regional priorities. In particular he emphasized the role of the National Co-ordinators and their importance in the successful implementation of the project work at both the regional and national level (Annex 6).

Dr. Danesi presented an overview on "Sustainable Development and Nuclear Techniques" (Annex 7) in which he reviewed the concept of sustainable development and the ways in which nuclear techniques could contribute to achieving the goals.

Dr. Parr (IAEA) presented a paper on "Environmental Applications of Nuclear Analytical Techniques: some International and Regional Perspectives" (Annex 8) in which he reviewed some IAEA programmes which illustrated the appropriate applications of NATs in monitoring and in research on environmental problems.

Dr. Zeisler (IAEA) presented the final paper for the morning session, entitled "Nuclear Analytical Techniques - Tools in the Harmonization of Environmental Measurements" (Annex 9). He reviewed some of the critical aspects concerned with the quality of results and the need for harmonization of the environmental measurements.

2. COUNTRY REPORTS

In the pre-meeting documentation the participants were asked to prepare a Country Statement for presentation at the Meeting and for inclusion in the Meeting report. They were asked to:

- detail their current situation
- review the past impact of activities in Nuclear Analytical Techniques (NATs)
- outline future plans for national activities in NATs

. identify future assistance required from the project in a regional context.

Each National Co-ordinator made an oral presentation on these topics. The full text of their Country Statements are listed in the following Annexes:

Bangladesh	-	Annex 10
China	-	Annex 11
India	-	Annex 12
Indonesia	-	Annex 13
Republic of Korea	-	Annex 14
Malaysia	-	Annex 15
Pakistan	-	Annex 16
Philippines	-	Annex 17
Sri Lanka	-	Annex 18
Thailand	-	Annex 19
Viet Nam	-	Annex 20

Following these Country reports, Mr. J. Fardy made a special report entitled "Nuclear Techniques in Australia". The full text is given in Annex 21.

3. TECHNICAL SESSION

Dr. Abd. Khalik Hj. Wood was elected Chairman for the Technical Session. There was a full discussion of the matters raised in the formal country statements and in other discussions. Analysis of the inputs identified a range of common focci which were then formulated into 14 conclusions and recommendations.

4. CONCLUSIONS AND RECOMMENDATIONS

The Meeting discussed a wide spectrum of issues associated with activities, topic areas and other matters relevant to the use of Nuclear Analytical Techniques for environmental and industrial studies.

The major conclusions and recommendation of the National Co-ordinators were that:

1. the Nuclear Analytical Techniques needed to be backed by accreditation to an international standard in order to have the status to

pursuade potential users of the relevance and acceptability of NATs measurements;

2. the most appropriate international standard to be adopted for this purpose would be ISO Guide 25 and this would be the basis for regionally harmonized procedures;

3. National Co-ordinators would promote the use of ISO Guide 25 at the National Level;

4. there would be an expert workshop on the details of ISO Guide 25 and this would be held in conjunction with the next meeting of National Co-ordinations in 1995, since it was the National Co-ordinators who were the most in need of detailed knowledge of the implications and the implementation of the standard;

5. the order of priority for the types of material to be analyzed for industrialization and environmental pollution was agreed as:

   First priority: airborne particulate matter
   Second priority: sediment and soil
   Third priority: natural water bodies and biological accumulators.

6. priority problem areas should be chosen by national authorities on the basis of local needs. Major topics may include:

   . the study of local pollution sources that may have a significant health impact;

   . long range transport (by air and water) of pollutants and identification of pollution sources;

   . baseline data for critical pollutants in selected environmental matrices;

   . trend monitoring for selected pollutants and matrices.

7. it was also recognized that there was a pressing need for training in the area of data analysis and interpretation and in the identification of pollution sources. The IAEA should consider having a regional training course for Asia and the Pacific on the specific issue of data analysis and interpretation in 1995 as part of their regular course programme since this subject was beyond the scope of the activities in the joint UNDP/RCA/IAEA project document but was seen as a priority area by the National Co-ordinators;

8. because of the high level of interest and importance of air pollution studies in the region, the IAEA was asked to support a new CRP for the Asia Pacific region on "applied research on air pollution using nuclear related analytical techniques", which is related to the existing global CRP on this topic;

9. intercomparison studies will be carried out regionally and nationally using standard materials relevant to the identified priority list and the results of the intercomparison studies would be presented as part of the agenda of future National Co-ordinator meetings;

10. there was a general regional interest in the analysis of foodstuffs and biological materials using nuclear analytical techniques and such skills could contribute to any extension of the RCA CRP on Reference Asian Man that might be concerned with the compiling of data on diet and associated factors;

11. the RCA Co-ordinator was asked to bring this to the attention of the final research co-ordination meeting on Reference Asian Man and explore whether it would be possible for an expert on NATs to brief the final RCM on the benefits of these techniques for future studies relevant to future co-ordinated research work and the compilation of data on diet and associated factors;

12. interest was expressed in the regional TC project on "Marine Contamination and Sedimentation" and the use of low level counting techniques for measuring environmental levels of radioisotopes and the

use of environmental radioisotopes as an indicator for studying environmental processes. The RCA Co-ordinator was asked to try to seek further funding for this project when the current extrabudgetary funds have been spent;

13. the RCA Co-ordinator was asked to clarify with the relevant Japanese agencies whether there was going to be unnecessary duplication between this project's focus on the analysis of airborne particulate matter and the proposal under the Japanese initiated programme of "International Nuclear Co-operation in Asia and the Pacific" which has been formulated for NAA on airborne contamination;

14. the importance of properly constructed sampling strategies was considered crucial to an adequate monitoring programme and there was a general need for assistance in this aspect. Protocols on the collection of samples were required and the IAEA was requested to assist in the preparation of written protocols. In addition there was seen to be a need for the provision of environmental specimen banking in the region and again the IAEA was requested to provide advice and assistance on the setting up, running and maintenance of such a bank in the region.

These conclusions and recommendations were unanimously endorsed by the National Co-ordinators as an accurate summary of the output from this meeting.

5. OTHER MATTERS

The Meeting considered it important to make as efficient use as possible of the financial resources through the linking of appropriate events. It was considered that economies could be achieved if the results of the intercomparison programmes were considered at the time of the National Co-ordinators Meeting (NCM). It was also considered beneficial to try to link the next NCM, scheduled for 1995, to the Australian Conference on Nuclear Techniques of Analysis being held in that year. Mr. Fardy undertook to discuss this with the organizing committee of which he is a member.

Participants also asked that emphasis should be placed at the country level to ensure that Governments understood the role of National Co-ordinators and the

tasks expected of them and also the role of the National Nuclear Research Institute in backstopping of technology acquired as a result of the TC projects.

The National Co-ordinators also requested that all NAT related project information be copied to them so that they could maintain awareness of current issues and actions. The Agency was asked to assist in this matter by instructing others involved in the project to pass communications to the respective National Co-ordinator.

The requirements for a Regional Training event scheduled in the Project Document for 1994 were discussed. The consensus view was that there were two major imperatives; one to inform senior management and decision makers involved in analytical laboratories about the benefits of using NATs; and, the other to provide training and "hands on" experience for "work bench" scientists who have direct responsibility for analyses. It was decided that both groups needed to be catered for and this would be done through a Regional Seminar for the senior managers and a Regional Training Course for the scientists. It was considered that this latter group could also benefit from the material presented at the Seminar which would be less technically oriented but would provide them with a better overall understanding of such issues as cost benefits, wider areas of potential application, etc. Both events would be phased in with the International Conference on Applications of Radioisotopes and Radiation in Industrial Development (ICARID-94), which is being jointly sponsored by the IAEA and will be held in Bombay 7-9 February 1994.

6. CLOSING REMARKS

The RCA Co-ordnator reviewed the activities and decisions made by the Meeting and thanked all the participants for their contributions and the positive and constructive way in which the structure for the project activities had been decided and formulated. He thanked the Government of Malaysia and the Nuclear Energy Unit (UTN) for hosting the Meeting and for providing such generous support. There was a vote of thanks to the UTN staff involved in the planning preparation and administration of the Meeting, especially the Organizing Committee.

Mr. Adnan Hj. Khalid formally closed the Meeting on behalf of UTN and the Malaysian Government. He thanked the IAEA for holding the Meeting at UTN and said it had been an honour for them to be chosen. All participants were wished a safe

journey home and the wish was expressed that the outcome of the Meeting would enable the strong project design to achieve significant success over the next three to four years.

JOINT UNDP/RCA/IAEA PROJECT RAS/92/073

FIRST MEETING OF NATIONAL CO-ORDINATORS FOR NUCLEONIC CONTROL SYSTEMS AND TRACER TECHNOLOGY

ANSTO, Lucas Heights, Australia
6-8 July 1993.

1. OPENING SESSION

The meeting was opened by Dr. David Cook, Executive Director, Australian Nuclear Science and Technology Organisation (ANSTO). He said that he was privileged to welcome the participants on behalf of the Australian Government. He noted that the Meeting would be one of the first activities organized under the framework of the new joint UNDP/RCA/IAEA project on the "Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development". He informed the participants about the linkages between this project and the programme of extrabudgetary assistance being provided by the Australian Government through the Australian International Development Assistance Bureau (AIDAB) to RCA. The first Regional Training Course on "the Application of Modern Isotope Techniques to Industry" which was held 3-14 May, had been part of this support. He invited participants to see ANSTO's facilities in a site tour and also arrangements would be made to deal with any specific interests. In conclusion he noted that the Meeting would have much to do in its task of interpreting the outline of the project, as set out in the Project Document, into a well-constructed programme that addressed the regional needs of the Member States and he looked forward to seeing the outcome.

Dr. J.F. Easey, RCA Co-ordinator, welcomed the participants on behalf of the IAEA and thanked the Australian Government and ANSTO for offering to host the Meeting.

Dr. Peter Airey was unanimously elected Chairman for the Meeting.

The participants and observers then introduced themselves to the Meeting. There were thirteen National Co-ordinators present from the RCA Member States, only Bangladesh and Singapore were not represented. There were 4 observers from Australia. The full list of participants and observers is given in Annex 1.

The draft Agenda was reviewed and slightly modified to take account of the absence of formal presentations from Bangladesh and Singapore (Annex 2).

Dr. Easey outlined the RCA programme of activities and reviewed the developments that had shaped the present project from its origins in the former UNDP Industrial project. Copies of overheads used in this presentation are given in Annex 3.

Dr. S.M. Rao presented a review of NCS and Tracers from a regional perspective. He had been a long-term expert for this area of technology in the UNDP Industrial Project and had had first hand experience of the status of the technology and the needs of various RCA Member States. The full text of his report is given in Annex 4.

Dr. B. Zatolokin, IAEA, presented an outline of the Agency's future programme in NCS and Tracer technology. The full text is given in Annex 5.

Dr. Y. Yurtsever reviewed the use of tracers for the study of pollutants in surface and ground waters (Annex 6) and also outlined where there would be Agency activities outside of the RCA programme that might be of interest to various Member States.

2. COUNTRY REPORTS

In the pre-meeting documentation the participants were asked to prepare a Country Statement for presentation at the Meeting and for inclusion in the Meeting report. They were asked to:

- detail their current situation
- review the past impact of the activities in NCS and Tracers
- outline future plans for national activities in NCS and Tracers
- identify future assistance required from the project in a regional content.

Each National Co-ordinator made an oral presentation outlining the country situation. The full text of their Statements are listed in the following Annexes. (The proposed participant from Bangladesh had not be able to get to Australia but he had

made arrangements to have his Country Statement sent to the Meeting. This was photocopied to all participants for consideration during the technical session).

Bangladesh	-	Annex 7
China	-	Annex 8
India	-	Annex 9
Indonesia	-	Annex 10
Republic of Korea	-	Annex 11
Malaysia	-	Annex 12
Mongolia	-	Annex 13
Pakistan	-	Annex 14
Philippines	-	Annex 15
Sri Lanka	-	Annex 16
Thailand	-	Annex 17
Viet Nam	-	Annex 18

Following these Country reports, Dr. Airey made a special report on "NCS and Tracers in Australia" (Annex 19) and the Japanese expert, Dr. Yoshiyuki Shirakawa, made a special report on "Future trends in Nucleonic Systems in Japan" (Annex 20).

3. TECHNICAL SESSION

Dr. Peter Airey was Chairman for the Technical Session. There was a full and active discussion of the matters raised in the formal Country Statements and in other discussions. The programme for NCS and Tracers, as defined in the Project Document in Outputs 1.1, 1.2 and 1.3 (Annex 21), was thoroughly considered and conclusions and recommendations were made to directly address the needs of the various activities specified there.

Dr. Airey informed the Meeting that the second Regional Training Course under the Australian extrabudgetary programme of support to this joint project would take place in 1994 and would be entitled "Applications of Nuclear Techniques to Materials Characterization and Compatibility Studies". The details of the associated National Seminar programme had been sent to all National Co-ordinators (Annex 22) and the results of their selections (Annex 23) would be now fitted into a time-table. Member States were asked to assist in the acceptance of the Seminars and their scheduling because the National Seminars have to be in pairs linked between countries to make efficient use of available funds.

4. CONCLUSIONS AND RECOMMENDATIONS

The following recommendations were made on the detail for the activities listed in the Project Document:

a) Activities 1.1.2 and 1.1.4 (combined)

Regional Workshop/Seminar on NCS small and medium sized paper industry.

- Regional Workshop/Demonstration - 2 weeks
- Regional Seminar - 1 week

Target Group:

Middle managers (2 weeks)
Decision makers (1 week)

Possible Location:

- China, Shanghai Instrument Co.
  Beijing No. 1 Paper Mill

  (Action: Professor Dang Shu Qin to investigate).

- Thailand and Japan are also possible hosts.

Timing: During 1995 - to coincide with the Chinese Nuclear Society Meeting on the Industrial Applications of Radioisotopes.

b) Activities 1.1.1 and 1.1.3 Expert Missions and National Seminars:

- One seminar per country
- One expert mission per country, National Co-ordinators to inform IAEA of priority requests.

  (Action: Records of recent missions to be reviewed to avoid duplication of effort).

c) **Activity 1.1.5 Fellowship Training/Scientific Visits:**

- 3m/m annually (1994-96)

d) **Activities 1.2.2 and 1.2.3 (combined)**

Regional Training Course on the application of isotope techniques in process optimization.

To include
- mathematical modelling/data evaluation
- planning of investigations
- radiation safety
- demonstrations

Duration: 3 week course:

Week 1: Preparation/general theory
Week 2: Demonstration (3 days)
Week 3: Data evaluation

Target Group:

National Tracer Group (NTG) or Industry personnel

Possible Locations:

Indonesia, Thailand, Sri Lanka, Philippines, Malaysia, India

(Action: National Co-ordinators in designated countries to approach industries and inform RCA Office).

Timing: During 1994

e) **Activity 1.2.4 Fellowship training/scientific visits**

- 3m/m annually (1994-96)

f) Activity 1.2.5 Expert Missions

- One expert mission per country, National Co-ordinators to inform IAEA of priority requests.

  (Action: Record of recent missions to be reviewed to avoid duplication of effort).

g) Activity 1.2.6 National Seminars

- 1 Seminar per country, National Co-ordinators to inform IAEA of priority request.

h) Activity 1.3.1

Regional Workshop on the Use of Tracer Technology to Study the Dispersion of Effluents in Waters.

To Cover
- Environmental problems/policy
- Planning of experiments
- Radiation Protection
- Data evaluation models
- Case studies

Duration: 2 weeks

Target Group:

Pollution control expert (EPA) (at least 1); NTG Member.

Possible Location:

(Action: National Co-ordinators to enquire concerning the possibility of hosting and inform RCA Office).

Timing: During 1994

i) **Activity 1.3.2**

Regional Workshop on the Use of Tracer Technology to Study the Dispersion of Effluents in Groundwaters.

To cover:
- Environmental problems/policy
- Planning of experiments
- Radiation Protection
- Data evaluation models
- Case studies

Duration: 2 weeks

Target Group:

Pollution control expert (EPA) (at least 1); NTG Member.

Possible Location:

(Action: National Co-ordinators to enquire on the possibility of hosting and inform RCA Office).

Timing: 1995

j) **Activity 1.3.3 Field Demonstrations (combined)**

Target Problems:
- River/Estuary/Ocean Dispersion
- Waste Treatment Ponds
- Aquifers
- Seepage

Duration: 2 weeks; 1 week each for surface and groundwater

(Specific recommendations to follow; to be discussed at the National Co-ordinators Meeting 1995).

Target Group:

. Pollution control expert (EPA) (at least 1; NTG Member; Participants from Regional Workshops (Participants from Regional Workshops 1.3.1, 1.3.2 to be given preference).

Possible Location:

Possibly Pakistan

(Action: National Co-ordinators to enquire on the possibility of hosting and inform RCA Office. Identification of suitable sites for demonstrations is important).

k) Activity 1.3.4 Fellowships/Scientific Visits

- 3m/m annually (1994-96)

l) Activity 1.3.5 Expert Missions

- 1 expert/country (average); National Co-ordinators to inform IAEA of priorities.

m) Activity 1.3.6 National Seminars

- 1 per country with the National Co-ordinators to inform the IAEA of their priorities, to be focused on EPA/Industry target groups.

It was noted that there would be some related relevant IAEA training events taking place in the future on aspects of hydrology. National Co-ordinators would like to be informed when the events are approved. They were:

. Isotope Hydrology Analytical Techniques, 1994 Vienna (Interregional)

. Isotope Applications with Emphasis on Flow and Transport Modelling (Interregional) - 1995 Vienna?

- Nuclear Techniques in Soil Erosion and Sedimentation Transport and Related Environmental Studies (Regional: Asia and Pacific) 1996 (venue to be decided).

In addition to the matters concerning the Project Document the following additional recommendations were made by the Meeting:

- it was recommended that requests on the maintenance of nucleonic equipment which is part of Nucleonic Control Systems should be considered to be a part of the existing RCA project on Nuclear Instrument Maintenance, RAS/4/008.

- it was recommended that a mechanism for recording and distributing information on case studies and on technical experience in these technology areas of NCS and Tracer Technology should be investigated as a matter of priority.

- it was recommended that, where applicable, there should be efforts towards compliance with the International Standards on Quality such as ISO 9000.

- it was recommended that the IAEA compile a profile on each of the National Tracer Groups detailing their staff, equipment and experience for both industrial process control and hydrological investigations.

5. CLOSING REMARKS

Dr. Airey reviewed the work of the Meeting and thanked the delegates for their contributions to the conclusions and recommendations which had been agreed. He said that the work by this Meeting had put on the detail required to define the various activities for the projects in NCS and Tracers and he looked forward to a successful programme being implemented. He wished all participants a safe journey home and reiterated how pleased both ANSTO and the Australian Government had been at having the privilege of hosting the Meeting.

Dr. Easey endorsed Dr. Airey's thanks to the participants for all their efforts which had translated into a good set of conclusions and recommendations. He

thanked the ANSTO Organizing Committee and the Secretariat for their planning and strong support which had contributed to the success of the Meeting. He wished all participants a good return journey and looked forward to future meetings.

INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ENERGIE ATOMIQUE
МЕЖДУНАРОДНОЕ АГЕНТСТВО ПО АТОМНОЙ ЭНЕРГИИ
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IN REPLY PLEASE REFER TO:
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DIAL DIRECTLY TO EXTENSION:
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RAS/8/069

9 December 1992

Dear 1~,

Subject: **New Australian Project on "Isotopes and Radiation in Industry and the Environment", (RAS/8/069).**

My office has now been provided with further information on the future programme of activities being funded by Australia and previously distributed to you within the context of the "Proposal for an IAEA/RCA project on the Applications of Isotope and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine" which was first mentioned at the RCA General Conference Meeting in 1991. With the Industry segment the following activities have been foreshadowed:

1) Regional Training Course on the Applications of Modern Isotope Technology to Industry, May, 1993.

2) Regional Training Course on the Applications of Nuclear Techniques to Materials Science, 1993.

3) A series of National seminars at times to be specified.

Attached are listed abstracts for seven seminars topics. You are invited to choose at least two topics for your country in line with national development priorities and nominate them in order of priority for consideration. At this stage only one seminar can be guaranteed. If you have requests for specific Australian experts, please include these in your selection.

Sent to RCA Co-ordinators except Australia and Japan

These seminars will be held in pairs. A nominal schedule is given below:

Day 1 (Rest Day)	arrive Country 1
Day 2	discussions and preparation
Day 3	Seminar
Day 4	Seminar
Day 4	Seminar
Day 5	Industrial visits/follow-up
Day 6	as above
Day 7	travel Country 2
Day 8 (Rest Day)	free
Day 9	discussions and preparation
Day 10	Seminar
Day 11	Seminar
Day 12	Industrial visits/follow-up
Day 13	return

I would be grateful for your responses once you have been able to complete negotiations with your counterparts.

I would like to extend to you my best wishes for the New Year.

Yours sincerely,

John F. Easey
RCA Co-ordinator
Division of Technical Co-operation
Programmes

Abstracts of Topics for National Seminars

Seminar 1: Radiation and UV Induced Surface Coating

The Seminar will cover the technical and economic aspects of the application of electron beam and UV coating to the printing and timber industries. Special emphasis will be placed on the formulations. Case studies will be presented of the marketing of these technologies by small companies in a commercially competitive environment. New methods for studying the characterization, binding and degradation of polymer coatings on metal surfaces will be discussed.

Seminar 2: Applications of Nuclear Techniques to Coastal Engineering.

The Seminar will cover the application of nuclear techniques to off-shore sediment and sand tracing with special reference to problems associated with port development. The use of tracer techniques to study oceanographic dispersion will be illustrated with the results of a two year evaluation of the deep ocean sewage outfalls of Sydney. The application of sealed source techniques to establishing the integrity of engineering structures will be discussed. Finally, the applications of nuclear techniques to archival monitoring in the coastal zone will be introduced. Many planners are increasingly concerned about the possible impact of climate change on sustainable development in coastal regions. A reliable knowledge of the past may help to plan for the future.

Seminar 3: Applications of Nuclear Techniques to Waste Management and Minimization

Emphasis will be placed on the mining industry. Two aspects of the problem will be emphasized. In the first, a range of industrial nucleonic control systems will be described which provide real time analyses on conveyor belts or in process streams. The use of the data to optimize process efficiency and hence minimize waste will be discussed. The second aspect of the seminar will be concerned with the management of mine tailings and the rehabilitation of mine sites and industrially contaminated land.

Seminar 4: Process Optimization in the Chemical and Refining Industries

Sealed sources are used in such diverse applications as column scanning, studying the state of pipelines and the densities of materials transported. It is now frequently possible to obtain tomographic images of pipeline cross sections under plant conditions. Open sources of isotopes can be used to monitor fluid flow and measure residence time distributions, and establish the

efficacy of catalytic columns and chemical reactors. Such is the efficiency of modern plant control, that isotope techniques are normally only used in addressing the most sophisticated problems. Examples of the type of work undertaken by the Tracerco group of companies world wide will be used to illustrate the current status of the commercial technology.

Seminar 5: Application of Nuclear Techniques to the Metals and Manufacturing Industry.

Nuclear and related techniques are frequently used in the characterization and modification of materials, X-ray diffraction methods have been used for decades; new opportunities are now arising from wider access to synchrotron sources. The range of applications of neutron diffraction is steadily increasing. Examples will be cited from modern advances in ceramics, composite materials and high temperature superconductors. Neutrons are also increasingly used in general industrial applications including measurement of internal strain in materials. The status of ion implantation technology as a means of modifying the properties of surfaces will be discussed. The purpose of the Seminar is to provide an exciting overview of the new industrial opportunities which are arising through modern materials science.

Seminar 6: Application of Nuclear Techniques to Off shore Resources Development

Isotope techniques have been widely used in supporting the off-shore oil and gas industry. Gamma transmission gauges are used in important aspects of quality assurance in the construction of off-shore platforms. Remotely operated vehicles (ROVs) are normally used sub-sea. The application of isotope techniques in assessing the condition of sub-surface pipelines, in locating leaks in pipelines, in monitoring drilling operations and factors affecting the efficiency of oil field recovery will be discussed. A review of experience in applying risk and reliability engineering in assessing off-shore platforms will be presented.

Seminar 7: Application of Nuclear Technique to Environmental Impact Assessment and Minimization

Strategies are being sought for sustainable development which will lead to steadily increasing living standards for all people. An important element of these strategies is to increase agricultural, mining and industrial production while reducing the resulting environmental impact. Nuclear techniques have been widely used in environmental impact assessment. Isotope

techniques are being used to study erosion and soil redistribution in catchments; the distribution of heavy metals through ecosystems and the dispersion of contaminants in surface and ground water and off-shore. Recent work in the fields of biological (including archival) monitoring of fresh water will be discussed. The long term aim of much of this work is to verify and calibrate predictive mathematical models which form the basis for management strategies . Practical examples will be discussed from the mining and agricultural sectors.

RESULTS OF RESPONSES FROM LETTER TO NC ON AUSTRALIAN NATIONAL SEMINAR.

The first priorities for the National Seminars under the Australian contribution are:

1) Radiation and UV Induced Surface Coating:

- Bangladesh
- China (mid-1993)

2) Applications of Nuclear Techniques to Coastal Engineering:

- Malaysia (late 1994 or early 1995)
- Viet Nam (4th quarter 1993)

3) Applications of Nuclear Techniques to Waste Management and Minimization:

- Mongolia
- Philippines

4) Process Optimization in the Chemical and Refining Industries:

- India
- Thailand
- Republic of Korea (22-24 March 1994)*

5) Application of Nuclear Techniques to Metals and Manufacturing Industry:

- Pakistan (12-17 November 1993)

6) Application of Nuclear Techniques to Resource Development.

7) Application of Nuclear Techniques to Environmental Impact Assessment and Minimization:

- Indonesia
- Sri Lanka

No selection was made by Singapore.

* following National Co-ordinators Meeting.

JOINT UNDP/RCA/IAEA PROJECT RAS/92/073

FIRST MEETING OF NATIONAL CO-ORDINATORS FOR NON-DESTRUCTIVE EVALUATION

Japanese Society for Non-Destructive Inspection, Tokyo, Japan

August 30 - September 2, 1993

1. OPENING SESSION

Dr. John F. Easey, RCA Co-ordinator, IAEA, welcomed the participants to the Meeting and thanked the Japanese Government for agreeing to host the event. He expressed his appreciation for the efforts of the Japanese Society of Non-Destructive Inspection in making all the arrangements for the meeting. He believed that it was very appropriate for the 1st meeting to be in Japan because Japan had contributed significantly to the success of the NDT activities in the RCA Regional Industrial Project over the last 10 years. He added that this was a very important meeting because it set the detailed framework for the new joint UNDP/RCA/IAEA Project.

Mr. Wada, Ministry of Foreign Affairs, welcome participants to the meeting. He thanked Professor Fukuoka, JSNDI, for the excellent work JSNDI had done working through the Ministry of Foreign Affairs, to organize the Japanese NDT contribution to the UNDP/RCA/IAEA Regional Environmental Project. He repeated that Japan was committed to providing assistance to the RCA.

Mr. Murasawa, Science and Technology Agency, welcomed participants. He reviewed STA's contribution to international agencies such as the IAEA.

Professor Fukuoka, President of JSNDI, welcomed participants on behalf of JSNDI. He expressed his sincere appreciation to Dr. Easey, Mr. Wada, Mr. Murasawa and Mr. Gilmour for their continuing work with JSNDI on regional NDT activities. He summarized Japan's contribution to the two phases of the Regional Industrial Project. He confirmed JSNDI's continuing commitment to Proficiency Testing and to providing Japanese experts for regional and national training courses and seminars.

Dr. Ooka, JSNDI, was elected Chairman of the Meeting and Mr. Gilmour was elected Secretary. Dr. Ooka emphasized the importance of the Meeting since it established the activities to be undertaken for the duration of the Project.

The draft agenda which had been circulated previously was adopted with only slight modification (Annex 1). All participants and observers then introduced themselves to the meeting. There were representatives from each of the fifteen RCA Member States (Annex 2).

Dr. Easey emphasized that the details of the project needed to be fully established by the end of the Meeting. He explained that the Project Document gave the activities which had to be completed to achieve project outputs. The Meeting needed to establish a consensus on all events that had to be organized. The Country Statements were an important part of the planning process since they showed the direction each country wanted to take over the next few years.

This new joint UNDP/RCA/IAEA project on environmentally sound technologies is one of the activities which RCA is undertaking. The distribution of the RCA budget over the past 8 years is shown in Figures 1 and 2.

The UNDP/RCA/IAEA project has the sub-projects shown in Figure 3 Essentially the sub-projects build on the linkages developed in the two phases of the UNDP Regional Industrial Project in the previous ten years (1982-1991).

The project terminal report emphasized that for a successful regional project it was necessary for:

- the use of long-term experts stationed in the region to enhance the technical programme,

- the importance of national training and national awareness programmes to reinforce the benefits of regional training,

- the need for an effective network of Co-ordinators at the project and sub-project level. (The National Co-ordinators represent their Governments and should have the backing of their Governments.)

Dr. Ooka explained that there were two basic directions to the JSNDI proposed programme. Firstly, there is the need to continue to develop a core of NDT personnel in each country. Secondly, there was a need to develop regional NDT harmonization by implementing Proficiency Testing Programmes for Level 2 UT and RT personnel.

The draft JSNDI work plan for the project is shown as Figure 4.

Mr. Gilmour gave a summary report on the previous 10 years of the UNDP/NDT sub-project, highlighting the achievements of the project and identifying possible problems.

2. COUNTRY REPORTS

In the pre-meeting documentation the participants were asked to prepare a Country Statement for presentation at the Meeting and for inclusion in the Meeting report. They were asked to report on:

- the current situation
- a review of the past impact of project activities
- future plans for national activities
- future assistance required from this project in a regional context.

Each National Co-ordinator made an oral presentation on these topics. The full text of their Country Statements are listed in the following Annexes:

Bangladesh	Annex 3
China	Annex 4
India	Annex 5
Indonesia	Annex 6
Republic of Korea	Annex 7
Malaysia	Annex 8
Pakistan	Annex 9
Philippines	Annex 10
Singapore	Annex 11
Sri Lanka	Annex 12
Thailand	Annex 13
Viet Nam	Annex 14

Special reports were submitted by Mr. Gilmour (Annex 15) and Dr. Ooka (Annex 16).

3. TECHNICAL SESSION

Dr. Ooka continued as Chairman for the Technical Session. There was a full discussion on the activities listed in the Project Document. Analysis of the inputs identified the following consensus for the conclusions and recommendations listed in the next section.

4. CONCLUSIONS AND RECOMMENDATIONS

The following recommendations were made on the details for the activities listed in the Project Document and, where appropriate, actions have been assigned.

Activity 1.5.1: Expert Missions

a. It was recommended that there should be an expert mission to Mongolia as soon as possible to evaluate the current status of NDT in that country and the specific industrial needs.

   ACTION: Mongolia to request

b. National Co-ordinators will inform the IAEA of their specific needs for short-term expert assistance.

   ACTION: National Co-ordinators

Activity 1.5.2: National Co-ordinators Meetings

c. It was recommended that the next NCM be held in 18 months time (1st Quarter 1995) and that a mid-term review would be an agenda item. The NCM which would follow that would be held in the 4th Quarter 1996 and would assess the full impact of the project as part of the agenda. These meetings would be held possibly in Indonesia and Japan.

d. The Meeting requested the Government of Japan to fund the 1995 NCM.

Activity 1.5.3: Regional Seminar/Workshop on NDE for Specific Industries.

e. There was a recommendation that there should be Regional Seminars/Workshops on three specific industries:

- NDT in Electric Power Generation
- NDT in oil, gas and petrochemical
- NDT in Aviation

There has been no specific funding set aside for this under the UNDP budget. National Co-ordinators were requested to enquire whether their Governments would be willing to provide financial support. National Co-ordinators will liaise with the RCA Co-ordinator on this aspect.

ACTION: National Co-ordinators

Activity 1.5.4: Regional Workshop on Non-Metallic Materials

f. It was recommended that there be a Regional Workshop held on NDT of Concrete to review the manufacture of concrete, the types of defects which can occur and the advantages and limitations of the various NDT methods which have been utilized.

Duration:	2 weeks
Target Group:	Senior NDT specialists with Level 2 qualifications in RT and UT with preference given to those with civil engineering or construction industry background.
Location:	to be advised
Timing:	1995

Since this activity was not funded under the UNDP budget, National Co-ordinators were asked to approach their Governments to enquire whether they could fund this Activity. National Co-ordinators are to notify the RCA Co-ordinator as soon as possible.

ACTION: National Co-ordinators.

Activity 1.5.5: National Seminars

g. National Co-ordinators are to advise the RCA Co-ordinator on their specific requirements. One week of expert assistance would be made available from the UNDP funding but would be on the basis of linked pairs of activities in two countries so that the costs of the airfares were minimized.

ACTION: National Co-ordinators

Activities 2.2.1 and 2.2.3: Regional Seminar and Workshop on NDT test pieces

h. It was recommended that these two activities be linked together to enable a team approach to be made for the production of test pieces by an NDT specialist and an expert welder from each Member State. In a Regional Workshop the expert welders would be instructed on how to produce test pieces with known defects in flat plate and pipe to meet national certification body requirements.

Duration:	3 weeks
Target Group:	Expert welders with specialization in manual metal arc welding.
Location:	Possibly Malaysia, Pakistan or India. Those National Co-ordinators are to consult with their Governments and inform the RCA Co-ordinator. ACTION: Malaysia, India and Pakistan National Co-ordinator.
Timing:	Second half 1994

In a 1 week Regional Seminar/Workshop senior NDT specialists with qualifications preferably at level 3 in UT or RT would examine the test pieces produced at the end of the second week of the test piece fabrication Regional Workshop. Further test pieces would be produced by the welders depending on the results obtained.

Duration:	1 week
Target Group:	Senior NDT specialists preferably with UT Level 3 or RT Level 3 qualification
Location:	As for RW test piece fabrication
Timing:	Second half 1994

The test pieces made will be available for National use.

Activity 2.2.2: Recommendations on NDE test pieces.

i. Dr. Ooka will advise National Co-ordinators on the results of the ISO Meeting TC135/SC7 to be held in Johannesburg in October 1993.

ACTION: Dr. Ooka

There may be further discussion at the 1995 National Co-ordinators Meeting.

Activities 2.2.4 and 2.2.9: Proficiency Testing Programme

j. It was recommended that the time table should be:

1993 Republic of Korea (November)
Singapore (November)
Japan (December)

1994 Australia (January)

1995 India and Philippines (1st half)
or Pakistan and China

Thailand and Viet Nam (2nd half)

1996 India and Philippines (1st half)

or Pakistan and China

Bangladesh and Sri Lanka (2nd half)

Both the Thailand/Viet Nam and Bangladesh/Sri Lanka visits will be subject to available finance. The other missions have indicative financing from the Government of Japan.

There will be two associated Meetings to assess the results of the PTP. In January 1994 there will be an assessment of Australia, Japan, Indonesia, Malaysia, Republic of Korea and Singapore. This meeting will be attended by project experts and one representative from each of the six countries and will take place in Melbourne from 24-27 January 1994.

There will be a second meeting held in conjunction with the 1996 National Co-ordinators Meeting which wili occupy two of the expected five days allotted.

Activities 2.2.5 and 2.2.6: Level 2 Examination Papers

k. It was recommended that all National Co-ordinators should submit to the RCA Co-ordinator samples of Level 2 papers for each method. These should come from either national training courses or national certifying body examinations. They should be sent to Vienna by 15 December 1993.

All contributions will be amalgamated into a single booklet which will be distributed to all National Co-ordinators. Any further action will be reviewed at the next NCM.

ACTION: National Co-ordinators and IAEA

1. The Meeting recommended that there was a need to review the practices governing practical examinations in the various RCA Member States at the next NCM. It was therefore agreed that National Co-ordinators will submit the following to the RCA Co-ordinator in January 1994 concerning level 2 practical examinations in RT and UT.

- marking scheme
- examples of papers
- instructions of participants
- number and type of test pieces
- examination duration

ACTION: National Co-ordinators

Activity 2.2.7: Regional Board of Examiners

This activity will be reviewed at the 1995 NCM in the light of the results obtained in activities 2.2.5 and 2.2.6.

Activity 2.2.8: Regional Model Qualifying Examinations

m. It was agreed that National Co-ordinators will submit Level 3 papers to the RCA Co-ordinator for review at the 1995 NCM.

ACTION: National Co-ordinators.

OTHER RECOMMENDATIONS

There were a number of other recommendations made by the Meeting:

n. All National Co-ordinators would endeavour to get their Governments provide financial assistance to the project for those unfunded activities.

ACTION: National Co-ordinators

o. The long-term expert should be recruited as quickly as possible within the budgetary limitations

ACTION: IAEA

p. The long-term expert should undertaken the following duties during a 1 year assignment.

- participate in all regional and all appropriate national training events

- prepare training course notes for eddy current testing and the surface methods to meet as a minimum the TECDOC 628 Level 2 requirements

- amend the ultrasonic training course notes to meet as a minimum the TECDOC 628 requirements

- design the Regional Training Course for NDT of Concrete

- prepare notes for an executive management course on NDT.

q. Bilateral agreements between NDT societies should be encouraged and every participating country without one should aim to have established an NDT Society by the end of the project in 1996.

ACTION: National Co-ordinators

r. All National Co-ordinators are to supply to the RCA Co-ordinator the names of experts qualified in the five methods who would be appropriate to undertake missions under the project.

Action: National Co-ordinators

s. The draft country reporting document (Annex 17) is to be referred to the Expert Meeting to prepare Materials for Accurately Recording and Monitoring Project Activities and Inputs in the RCA Projects, 20-24 September 1993, Vienna.

ACTION: RCA Co-ordinator

t. The RCA Co-ordinator distribute copies of TECDOC 628 to all National Co-ordinators

ACTION: RCA Co-ordinator

u. National Co-ordinators should investigate the feasibility of conducting a national proficiency testing programme on ultrasonic thickness

measurement based on the methodology used in Annex 18 and report on the outcome at the next NCM.

ACTION: RCA Co-ordinators

v. All Member States that do not yet have national qualification and certification standards are encouraged to utilize ISO 9712 (Annex 19) as a basis for the development of such standards.

ACTION: Relevant National Co-ordinators

These conclusions and recommendations were unanimously endorsed by the National Co-ordinators as an accurate summary of the output from this Meeting.

5. OTHER MATTERS

The Meeting welcomed the presence of the new National Co-ordinators from India, Indonesia and Mongolia and recorded its appreciation of the contribution made by the previous National Co-ordinators from India and Indonesia.

The Meeting proposed a vote of thanks to JSNDI for their generousity in hosting and supporting the Meeting and to JSNDI staff and Dr. Ooka for outstanding efforts in administrating and managing all aspects of the Meeting.

6. CLOSING REMARKS

The RCA Co-ordinator reviewed the activities and decisions made by the Meeting and thanked all the participants for their contributions and the positive and constructive way in which the project activities had been discussed and resolved. He thanked the Government of Japan and JSNDI for hosting the Meeting and for providing generous support.

Dr. Ooka formally closed the Meeting on behalf of JSNDI and the Government of Japan. he thanked the IAEA for holding the Meeting at JSNDI and said it had been an honour for them to be chosen. He wished participants a safe trip home.

JOINT UNDP/RCA/IAEA PROJECT RAS/92/073

FIRST MEETING OF NATIONAL CO-ORDINATORS FOR RADIATION TECHNOLOGY

JAERI, Takasaki Radiation Chemistry Research Establishment

Takasaki, Japan
4-8 September 1993

1. OPENING SESSION.

Dr. S. Sato , Director General of Takasaki Radiation Chemistry Research Establishment (TRCRE) welcomed participants on behalf of Japan Atomic Energy Research Institute (JAERI) and on behalf of TRCRE. He expressed continuing interest and willingness for TRCRE to participate in the programme of radiation technology and transfer of technology to RCA developing Member States.

Mr. S. Suzuki (Ministry of Foreign Affairs) and Mr. M.Murasawa (Science and Technology Agency) welcomed participants on behalf of corresponding authorities and indicated the continued commitment and support of the Government of Japan to the joint UNDP/RCA/IAEA project.

Dr. S.Machi, DDG-RI, welcomed participants on behalf of the Agency and expressed appreciation and thanks to the Government of Japan and JAERI/TRCRE for agreeing to host the event, as well as for financial support. He stressed the importance of radiation technology for conservation of environment and sustainable development. The full text is given in Annex 1.

The participants and observers introduced themselves. All RCA Member States were represented by National Co-ordinators. In addition five observers from Japan attended the meeting. The list of participants is given in Annex 2.

Dr.K.Makuuchi (Japan) was elected Chairman for the Meeting.

The objectives of the Meeting were presented and discussed.

2. AGENDA.

The proposed Agenda was accepted with minor modifications.It is given in Annex 3.The Agenda was divided into the following main blocks:

Opening and introduction. As described in the previous section.

Review lectures. Drs. Machi, Tokunaga, Hashimoto and Makuuchi described main applications and impact of radiation technology on conservation of environment. Dr.Markovic summarized the main achievements of the past UNDP/RCA/IAEA two projects and lessons learned. It was pointed out that:

- training (regional and national training courses and workshops) and promotion (mainly national seminars) were the main activity of the projects;
- a large number of persons were trained on different applications;
- regional training programme provided a unique opportunity for training on subjects normally not available in standard university curricula in developing countries ; it was apparent from results of evaluation of previous courses that more training at the basic level was and still is needed throughout the region;
- the participation of industry at the regional training courses was too low and had actually declined in the second phase of the project (from 34% to 28%);
- the nomination of participants at the country level remains to be a significant problem, for example, no nominations in spite of interest; nominations of persons with inadequate or wrong background; lack of interest for the subject, etc.
- lack of follow-up mechanism at the national level; and lack of further transfer of knowledge gained to other persons in the country.

The basic concept of the new project was explained and discussed. It was agreed that the programme, as defined in the project document, reflects well the actual needs and interests of participating countries.

Country reports. In accordance with terms of reference, all NCs presented status report on national activities, status of industrial applications and radiation research. The full text of all reports (except Mongolia) is given in the Annexes 4 to 17.

Discussion, Work Plan for 1994 and tentative for 1995. Work Plan for 1994 was discussed in details and for 1995 only tentatively. The discussion covered:

- regional activities,
- national activities,
- individual expert missions,
- individual fellowships.

The proposed list of activities for 1994 is given in Annex 18 and for 1995 in Annex 19.

It was understood that the list of activities has to be confirmed by the Agency on the basis of actual budget allocations and that, if budget constraint arise, the list may be amended correspondingly. This is, in particular, the case for the list of individual expert missions and expert requirements for different national activities.

The activities proposed follow as closely as possible the activities specified in the project document. The priorities and subjects given in the project document were fully endorsed. During the 1994 and 1995 main priorities for training and transfer of technology include:

1. Radiation sterilization: training programmes to reflect the principles and content of the ISO standard with three main categories of beneficiaries : (a) organizations that operate radiation facilities and provide service to industry; (b) industry using radiation sterilization technology; and, (c) government regulatory authorities.

2. Environmental applications; purification of flue gases and decontamination of municipal and industrial waste waters.

3. Fundamental aspects of radiation technology: basic aspects relevant to main applications and technology transfer programme.

Technical visits. NCs visited facilities, laboratories and radiation sources in TRCRE. A half a day visit was paid also to the Electron Beam Center, Iwasaki Electric Co.,at Gyoda, Saitama.

Discussion, conclusions and recommendations. After discussion, the Meeting reached agreement on set of conclusions and recommendations. Recommendations were given to the Agency and to the RCA Member State Governments.

3. CONCLUSIONS.

3.1. The Meeting broadly reviewed the status of radiation technology applications in various Member States. The Meeting noted that the objectives set out in the new project and the activities planned for achieving the stated outputs are extremely relevant to the programmes as described by the National Co-ordinators in the country reports. Radiation technology applications in the areas of medical products sterilization, treatment of sewage sludge and waste waters, detoxification of flue gases, radiation vulcanized natural rubber latex are of considerable interest to the Member States.

3.2. In order to capitalize fully on the knowledge and expertise gained through the implementation of the earlier UNDP industrial project, conscious efforts should be made to increase industry participation in the various activities of the new project. Suitable mechanisms/linkages should be put in place for ensuring continuing interaction and dialogue between national atomic energy centres and the industries for promoting radiation applications in relevant areas.

3.3. National Executive Seminars are considered to be most beneficial for promoting technology transfer to industry. They provide useful forums for bridging the possible gaps between R&D activities and practical demonstrations in an industrial set-up.

3.4. Special efforts need to be made in the area of RVNRL (where considerable efforts have been put in so far by setting demonstration facilities in the region, and where industry has shown interest in adopting the radiation route) by providing radiation processing services to meet the industry's needs.

3.5. The practice of assessment of participants by conducting examinations by open book at the completion of the training course provides a good measure of their understanding of the course programme and appreciation of the technical aspects of the technology.

3.6. The network of National Co-ordinators set-up in the region for this sub-project was considered to be extremely useful in the implementation of the project activities. However, the National Co-ordinators will be expected to play an increased interactive role with the industries in their own countries for successful completion of the project.

3.7. The Meeting of the National Co-ordinators discussed the work plan for 1993, 1994 and 1995 and noted the activities planned in 1993. The Meeting approved the work plan outlined for 1994 and 1995 for regional and national activities in Annexes A and B. The Meeting endorsed the requests made by the Member Countries for fellowships and expert missions for various activities and requested the Agency to provide funds for this purpose to the extent possible.

3.8. The Meeting also endorsed the suggestion of Singapore that the Agency make provision for certain identified experts to stop over in Singapore for a short period (1-2 days) while on expert mission in other countries of the region. This will enable the national authorities in Singapore to organize promotional meetings and programmes for the benefit of industries in Singapore, taking advantage of the presence of experts in the region.

3.9. The second meeting of National Co-ordinators will be held in Hanoi, Vietnam, last quarter of 1994.

4. RECOMMENDATIONS TO THE AGENCY.

4.1. The Meeting recommends that the new project should aim to evolve standard practices in the application of radiation technology in areas of curing, vulcanization of rubber latex, detoxification of flue gases, hygienisation of sewage sludge, etc. using the experiences of countries which have developed/adopted these techniques.

4.2. The Meeting recognizes the importance of choosing the right candidates for participation in regional training programmes. The Meeting recommends that the National Co-ordinators of the RT sub-project should be consulted in the selection of the candidates for RTC. In order to facilitate this, the Agency should send copies of announcements of RTC to the National Co-ordinators in addition to the other recipients of the announcements, e.g., country missions in Vienna and appropriate ministry of the Government as per Agency's normal procedure.

4.3. Further, the Agency may evolve a suitable procedure or guidelines for ensuring a minimum understanding/ competence on the part of the prospective candidate in the subject of the RTC/RWS before his or her acceptance for participation in the RTC/RWS.

4.4. The Agency should initiate preparation of a series of information packages on the present status/achievements of various technologies and the scope of their application the world over and particularly in the RCA countries. This will help the RCA Member States to promote these technologies amongst the local industries.

4.5. At the conclusion of the RTC/RWS, an examination should conducted to assess the level of competency achieved by the national participants. The results of this assessment should be communicated to the National Co-ordinators of the sub-project.

4.6. As a follow-up from NES, a prospective user, who has demonstrated keen interest in adopting radiation technology in his field of work, may be supported through fellowships/ expert missions to assist him in obtaining first-hand knowledge of the technology and in adopting it to his own requirements.

5. RECOMMENDATIONS TO THE GOVERNMENTS.

5.1. The information on the beneficial use of radiation technology in specific application areas should be made available by the national atomic energy centres in each country to appropriate agencies such as other concerned ministries of the Government, organizations of industries, chambers of commerce, etc. for creating increased awareness amongst user industries. This will help industries in specifying the incorporation of the appropriate radiation technique in the technology package to be obtained from overseas suppliers.

5.2. Each country may set priority and focus its efforts on certain specific RT applications which are of immediate and direct relevance to that country so that the project activities could make a meaningful impact in the identified areas.

5.3. For reaping the full benefits of technology transfer, each country should maximize industry participation in national and regional events such as EMS, TC and Workshops.

5.4. Special care and attention need to be given to the selection of candidates for training programmes conducted under the project. The National Co-ordinators should be closely associated with the selection of the candidates from their own countries and in the follow-up activities pursuant to the candidates' training for assessing the practical use of the knowledge gained by the candidate in the training course.

5.5. For extending the benefits of the candidate's training to other potential users of the technology in the country, the trained candidate should be advised to give a seminar to other national colleagues on his return, which should highlight the technical and commercial information gathered by him. The trained candidate should make a formal report in this regard to the Government and the IAEA on completion of the seminar. The report may indicate future steps that may be taken by the industry/Government for effecting technology transfer as applicable. The National Co-ordinators may interface with the national counterparts for ensuring speedy follow-up action.

5.6. The National Co-ordinators should inform the Agency as soon as possible the details of the national activities as per the work plan recommended at this NCM. The following details should be provided to the RCA Co-ordinator's Office to enable him to take appropriate action:

- title of activity and type (course, seminar, workshop, etc.) and reference to the project activity in the project document;
- proposed dates, duration and location;
- programme , or at least an outline of the programme;
- number of experts and duration;
- names of experts identified by NC (if known) and subject areas to be covered by the experts;
- application for fellowships have to be submitted on a standard Agency forms and sent through official channel.

The above information should be provided as early as possible,but at least six (6) months in advance of the proposed event.

REGIONAL ACTIVITIES - 1994

Key to the list of activities:

1. Project document activity.
2. Type of activity.
3. Title.
4. Place and duration.
5. Proposed date (if any).
6. Estimated budget and source.
7. Comments (if any).

LIST OF PROPOSED ACTIVITIES:

I.

1. 1.6.4.
2. Seminar
3. Application of electron beam technology for purification of flue gases.
4. Takasaki, Japan, 1 week (including visits to facilities).
5. October
6. ....., JPN
7.

II.

1. 1.7.3.
2. Training course
3. Fundamental aspects of radiation technology and environmental applications.
4. Takasaki, Japan, 2 weeks
5. May/June
6. 80,000 $, JPN
7.

III.

1. 1.7.5.
2. Coordination
3. 2nd Meeting of National Coordinators
4. Hanoi, Vietnam, 1 week
5. October
6. ....., UNDP
7.

IV.

1. 2.1.4.
2. Training course
3. Radiation sterilization - Validation, routine control and application of ISO standard.
4. Bangkok, Thailand, 2 weeks
5. May/June
6. 72,000, UNDP
7.

V.
1. 2.3.1.
2. Workshop
3. Radiation processing - process control and dosimetry, regional network
4. Bombay, India, 1 week
5. Sept/Oct.
6. 45,000, UNDP
7.

SUMMARY

Activity	Country	Duration	Approx date	Budget and source
1.6.4.	Japan	1 week	October	....., JPN
1.7.3.	Japan	2 weeks	May/June	80,000, JPN
1.7.5.	Vietnam	1 week	October	....., UNDP
2.1.4.	Thailand	2 weeks	May/June	72,000, UNDP
2.3.1.	India	1 week	Sept/Oct	45,000, UNDP

NATIONAL ACTIVITES - 1994

Note: The following list is provisional and implementation will depend on the availability of funds, and submission of detailed requests (see recommendation 5.6.).

NATIONAL TRAINING COURSES.

Country	Activity	Subject	m/w
BGD	1.6.3.	Rad. processing of municipal waste	4
CPR	1.7.2.	Radiation curing	2
	1.7.7.	Radiation crosslinking	2
THA	1.7.2.	Radiation curing	2
		Total m/w	10

NATIONAL SEMINARS.

Country	Activity	Subject	m/w
IND	1.7.10	RVNRL	-----
INS	1.7.4.	EB technology	2
MAL	1.7.7.	Radiation technology	-----
	1.7.7.	EB crosslinking	2
VIE	1.6.2.	Rad. processing of municipal waste	4
	2.1.6.	Radiation sterilization	3
PHI	1.7.7.	Radiation curing	1
SRL	1.7.7.	RVNRL	2
PAK	2.1.6.	(to be determined)	2
		Total m/w	16

INDIVIDUAL EXPERTS.

INS	2.3.3.	Radiation safety (EB)	8
MON	1.6.3.	Radiation technology	2
VIE	1.7.4.	Radiation crosslinking	4
PHI	1.6.6.	Flue gases	1
ROK	1.6.6.	Flue gases	1
THA	1.6.3.	.....	2
SIN	(see conclusion 3.8.)		2
		Total m/w	20

FELLOWSHIPS.

BGD	1.7.11		8
INS	1.7.11		8
MAL	1.7.11	Flue gases/POL	8
VIE	1.7.11		8
SRL	1.7.11		4
		Total m/w	36

SUMMARY

TYPE OF ACTIVITY	TOTAL M/W
National training courses	10
National seminars	16
Individual missions	20
Total m/w	46 (11.5 m/m)

REGIONAL ACTIVITIES - 1995

(provisional)

Key to the list of activities:

1. Project document activity.
2. Type of activity.
3. Title.
4. Place and duration.
5. Proposed date (if any).
6. Estimated budget and source.
7. Comments (if any).

I.

1. 1.6.1.
2. Training course
3. Application of electron beam technology for purification of flue gases
4. Takasaki, Japan, 2 weeks
5.
6. ....., JPN
7.

II.

1. 1.6.4.
2. Training course
3. Application of radiation processing for decontamination and cleaning of liquid waste.
4. Takasaki, Japan, 2 weeks
5.
6. ....., JPN
7.

III.

1. 1.7.1.
2. Training course
3. Radiation (UV and EB) curing of surface coatings and inks
4. Sidney, Australia, 2 weeks
5.
6. ....., UNDP
7.

IV.

1. 1.7.9.
2. International Symposium
3. Radiation vulcanization of natural rubber latex - technology and economics.
4. K.Lumpur, Malaysia, 1 week
5.
6. ....., JPN
7.

V.

1. 2.1.3.
2. Training course
3. Industrial sterilization - regulations, standards and enforcement
4. Sidney, Australia
5.
6. ....., UNDP
7.

VI.

1. 2.3.2.
2. Workshop
3. Safe operation of radiation facilities - regulations and inspection
4. Takasaki, Japan, 1 week
5.
6. ....., JPN
7.

SUMMARY

Activity	Country	Duration	Approx date	Budget and source
1.6.1.	Japan	2 weeks		....., JPN
1.6.4.	Japan	2 weeks		....., JPN
1.7.1.	Australia	2 weeks		....., UNDP
1.7.9.	Malaysia	1 week		....., JPN
2.1.3.	Australia	2 weeks		....., UNDP
2.3.2.	Japan	1 week		....., JPN

NATIONAL ACTIVITIES - 1995

Note: The following list is provisional and implementation will depend on the availability of funds, and submission of detailed requests (see recommendation 5.6.).

NATIONAL TRAINING COURSES.

Country	Activity	Subject	m/w
BGD	1.7.2.	Radiation curing	4
MON	1.7.4.	Radiation chemistry and technology	2
VIE	2.1.5.	.....	2
CPR	2.1.5.	.....	3
SRL	1.7.2.	Radiation curing	4
		Total m/w	15

NATIONAL SEMINARS.

IND	1.6.5.	Flue gases	2
INS	1.7.7.	Radiation technology	2
VIE	1.6.2.	.....	2
PHI	2.1.6.	Decontamination of sludge	1
	1.6.5.	.....	2
ROK	1.6.5.	Flue gases	1
CPR	1.7.7.	Biomaterials	3
	1.7.7.	Ion beam applications	3
	1.6.3.	.....	2
SRL	1.7.7.	Radiation curing	4
PAK	1.6.5.	.....	2
		Total m/w	24

INDIVIDUAL EXPERTS.

MAL	1.6.6.	Flue gases	2
THA	1.6.6.	.....	2
		Total m/w	4

P r o s p e c t u s

Title:	UNDP/IAEA/RCA REGIONAL TRAINING COURSE ON ENVIRONMENTAL APPLICATIONS OF RADIATION TECHNOLOGY (BASICS)
Place:	Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute, Takasaki, Japan
Date:	10 - 21 May 1993
Deadline for nominations:	15 February 1993
Organizers:	The Government of Japan through the Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute, in co-operation with the International Atomic Energy Agency
Language:	English
Participation:	The training course will be open to 15 participants from developing RCA Member States in the Asia and Pacific region.

Background and introduction:

Radiation chemistry is a branch of chemistry that studies the chemical changes induced in materials exposed to high-energy radiations.

Practical application of radiation chemistry today extends to many fields, including health care, food and agriculture, manufacturing, and telecommunications among others.

Radiation chemistry has influenced the development of other specialisms related to chemistry, chemical kinetics, organic chemistry, photochemistry, free radical chemistry, biochemistry, life sciences, etc.

An understanding of the basic principles of radiation chemistry and of the chemical reactions induced by radiation is necessary for implementing and extending practical applications. Technology transfer, research and development as well as many practical aspects, such as process control, product characterization, etc. depend strongly on understanding of fundamental principles and mechanisms.

It is particularly important for developing countries to transfer and apply radiation technology in their industries. An infrastructure and a scientific base in fundamental sciences is an important criterion for successful transfer and application of a new technology.

In spite of the continuous growth of the radiation industry, in terms of number of facilities and industrial enterprises using it, the volume value and variety of products of radiation chemistry is slowly disappearing from academic curicula in developed countries. It is either removed completely or absorbed in other curriculum areas as a minor components. With few exceptions, radiation chemistry is almost absent from university courses in developing countries. Chemists and chemical engineers graduate without being exposed to this branch of chemistry and its applications in various industrial sectors. Postgraduate studies are mainly available in foreign countries and few in developing countries have access to it. Thus research programme in this field suffer in universities and nuclear research institutions with a consequent lack of support for applied research and industrial projects. The effectiveness of technology transfer is also affected.

An increasing number of developing countries are using radiation technology and looking for new applications and projects. The building of infrastructure through training is thus a first and essential step. Training can complement and support academic education, and is needed urgently in many countries. First, the immediate needs of the developing countries should be addressed. With the application of open learning system, a wider spectrum can be covered with increased effectiveness.

Purpose of the course:

The purpose of the course is to provide a basic radiation chemistry course for personnel involved in:

- fundamental and applied radiation (chemistry) research
- teaching of chemistry at universities and high schools
- research in biological sciences and radiobiology
- research in food irradiation chemistry
- industrial applications of radiation chemistry and technology
- technology transfer and development.

Participants' qualifications:

Candidates should have a degree (or its equivalent) in chemistry, chemical engineering, nuclear engineering biochemistry, pharmacy, or related fields. A minimum of two years work in areas related to radiation chemistry is desired. An understanding of the basic principles of physics and radiation science would be essential. Candidates are required to familiarise themselves with material provided in advance of the course.

Course format: The course will have the following main components:

- lectures
- classroom exercizes
- laboratory exercizes
- field visits (laboratories and industrial facilities),(where applicable and possible)
- individual assessment (tests and examinations).

For comparison, it is intended that the full two-week course should be roughly equivalent to a full semester university course of about 15 weeks.

A final examination will be held at the end of the course. Satisfactory pursuance of the course and results at the examinations will qualify participants to receive a certificate.

Application procedure: Nominations may be submitted in duplicate on the standard IAEA application form for training courses. completed forms should be endorsed by and returned through the official channels established (the Ministry for Foreign Affairs, the National Atomic Energy Authority or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 February 1993 Nominations received after that date or applications which have not been routed through one of the afore-mentioned channels cannot be considered.

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

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

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

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

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

Prospectus

Title:	UNDP/IAEA/RCA REGIONAL TRAINING COURSE ON RADIATION TECHNOLOGY FOR ENVIRONMENTAL CONSERVATION
Place:	Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute, Takasaki, Japan
Date:	27 September - 8 October 1993
Deadline for nominations:	30 June 1993
Organizers:	The Government of Japan through the Takasaki Radiation Chemistry Research Establishment, Japan Atomic Energy Research Institute, in co-operation with the International Atomic Energy Agency
Language:	English
Participation:	The training course will be open to 15 participants from developing RCA Member States in the Asia and Pacific region.
Purpose of the course:	The purpose of the course is to provide information about radiation technology applications for conservation of the environment, and in particular about: - purification of flue gases - decontamination of municipal waste (water and sludge) - processing of industrial waste (chemical pollution) - other applications and environmental benefits or radiation processing in general.
Scope of the course:	The course will deal with environmental applications of radiation processing.
Participants' qualifications:	Candidates should have a university degree in chemistry, chemical engineering or nuclear engineering. Background and experience in radiation chemistry or radiation microbiology is required.
Course format:	The course will consist of lectures, classroom exercizes, laboratory exercizes, field visits, and tutorial (discussion) sessions. Examinations will be held at the beginning, middle and at the end of the course. Satisfactory pursuance of the course and the results of the examinations will qualify participants to receive a certificate.

Application procedure:

Nominations may 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, not later than 30 June 1993. Nominations received after that date or applications which have not been routed through one of the afore-mentioned channels cannot be considered.

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

Language certificate:

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

Administrative and financial arrangements:

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

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

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

Prospectus

Title:	REGIONAL (RCA) WORKSHOP ON RADIATION PROCESSING - THE ECONOMIC BENEFITS
Place:	Beijing Institute of Nuclear Engineering, Beijing, China
Date:	11 - 16 October 1993
Deadline for nominations:	30 June 1993
Organizers:	The Government of China through the Beijing Institute of Nuclear Engineering, in co-operation with the International Atomic Energy Agency
Language:	English
Participation:	The workshop is open to 13 participants from developing RCA Member States in the Asia and Pacific region.
Purpose of the workshop:	The main purpose of the workshop is to exchange information about economic aspects of various industrial applications of radiation processing, to discuss and analyse the main factors affecting the economics of the technology.
Participants' qualifications:	Candidates should be responsible for management and operation of industrial radiation facilities, gamma or electron beam accelerators in their home countries.
Programme of the workshop:	The programme of the workshop will include the following topics: - capital investment and financial aspects - operational cost and process optimization - economic benefits - radiation safety and technology - social effect - visits to radiation facilities in Beijing area - transfer of technology and related problems - quality assurance and international and national regulations and standards. Participants are expected to prepare reports covering the subjects above and with reference to the actual experience.

Application procedure:

Nominations may be submitted in duplicate on the standard IAEA application form for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry for Foreign Affairs, the National Atomic Energy Authority or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 30 June 1993. Nominations received after that date or applications which have not been routed through one of the above-mentioned channels cannot be considered.

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

Language certificate:

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

Administrative and financial arrangements:

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

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

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

P r o s p e c t u s

Title:	REGIONAL (RCA) TRAINING COURSE ON INDUSTRIAL APPLICATION OF NON-DESTRUCTIVE TESTING AND EVALUATION
Place:	Nuclear Training Centre, Korea Atomic Energy Research Institute (KAERI), Daejon, Republic of Korea
Date:	7 - 27 October 1993
Deadline for nominations:	15 July 1993
Organizers:	The Government of the Republic of Korea, through the Korea Atomic Energy Research Institute (KAERI), in co-operation with the International Atomic Energy Agency (IAEA)
Language:	English
Participation:	The course will be open to 15 participants from developing RCA Member States in the Asia and Pacific region.
Purpose of the course:	The purpose of the training course is to provide participants with the knowledge and the experience of non-destructive inspection of nuclear power plants.
Participants' qualifications:	Candidates should have a university degree or diploma in engineering or science, and a minimum of two year's experience in non-destructive testing. Candidates must have at least level 2 certificate(s) in any NDT methods obtained from a nation certification scheme or internationally known qualification scheme such as ASNT-SNT-TC-1A draft DIS 9712, or UNDP/IAEA/RCA regional training course.
Nature of the course:	The training course will consist of lectures, panel discussions, small group workshops and demonstrations in various inspection methods. A scientific visit to a nuclear power plant will also be included.
Outline of the course:	The following subjects will be covered: - Introduction to industrial application of NDT and evaluation - Metallurgy and welding - Ultrasonic testing - Eddy current testing - Magnetic particle testing - Liquid penetrant testing - Radiographic testing - Acoustic emission testing - Visual inspection - Leak testing - Neutron radiographic testing - Case study on industrial application of NDT and evaluation - Site lectures and technical visit - Others

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the offical channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 July 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

A copy of the nomination form should also be sent to the RCA Counterpart:

Mr. Mun-Ki Lee
Director
Atomic Energy International Cooperation Division
Ministry of Science and Technology
Government Complex II
Gwachun, Kyunggi-do, 427-760
The Republic of Korea

Telex: MIOST K 24230
Phone: 503-7651/7671
Fax: (82)(02) 503 7673

Language certificate:

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

Administrative and financial arrangements:

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

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

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

P r o s p e c t u s

Title:	REGIONAL (RCA) TRAINING COURSE ON THE APPLICATION OF MODERN ISOTOPE TECHNIQUES TO INDUSTRY
Place:	Australian Nuclear Science and Technology Organisation (ANSTO), Sydney, Australia
Date:	3 - 14 May 1993
Deadline for nominations:	15 February 1993
Organizers:	The Government of Australia thourgh the Australian Nuclear Science and Technology Organisation (ANSTO), in co-operation with the International Atomic Energy Agency (IAEA)
Language:	English
Participation:	The training course is open to 20 participants from developing RCA Member States in the Asia and Pacific region.
Purpose of the course:	The purpose of the course is to contribute to the process of sustainable development in RCA countries through the provision of instruction in the application of modern radioisotope techniques to industry. Emphasis will be placed on technologies designed to improve production efficiency, enhance the recovery of natural resources and to monitor and reduce the environmental impact of development. Following the course, a series of national seminars will be offered to augment the process of technology transfer.
Participants' qualifications:	Candidates should be experienced and qualified scientists or engineers from Government, universities, or industry, with responsibility for contributing to national development through the application of industrial radioisotope technology. Although the course will be self contained, some background in tracer techniques would be an advantage.
Scope and outline of the course:	The course will comprise the following elements: - Basic introduction to nuclear science, radiation detection and measurement - Design of investigation including the choice of isotopes, transport regulations and radiation protection - Application of isotope techniques to process optimisation including flow measurements, leak detection, residence time distribution studies - Increasing the efficiency of recovery and usage of natural resources - Nucleonic gauging - Marine and sediment tracing and other off-shore applications - Advances in technology including industrial tomography, modern visualisation techniques and operations in difficult locations.

Practical demonstrations and laboratory work will be arranged as well as a number of general informal evening discussions on topics of special interest. Participants will be invited to speak on their own programmes should they so wish.

As an integral part of the course, participants will attend a one day Symposium on Industrial Radioisotope Technology which is being organised by the Australian Institution of Engineers.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Authority, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 February 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

Please note that a copy of the nomination forms should also be sent to:

Mr. W.A. Wiblin
Industrial Applications
Environmental Science
Australian Nuclear Science and
Technology Organisation (ANSTO)
Lucas Heights Research Laboratories
Private Mail Bag 1
Menai NSW 2234
Australia

Telex: AA24562
Phone: 61(2) 717 3358
Fax: 61(2) 717 9267

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

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

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

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

Proposal for a New RCA Co-ordinated Research Programme

APPLIED RESEARCH ON AIR POLLUTION USING NUCLEAR-RELATED ANALYTICAL TECHNIQUES

Background:

This proposal is presented as a possible extension of the new Joint UNDP/RCA/IAEA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development: *Sub-Project on Nuclear Analytical Techniques*. At the first meeting of national co-ordinators held in Kuala Lumpur in June 1993 it was decided to give first priority to the study of air pollution using internationally co-ordinated and validated techniques for sample collection and analysis. However, no funding is currently available within the Joint UNDP/RCA/IAEA Project for setting up a Co-ordinated Research Programme (CRP) on this topic.

The Agency already has a global CRP on "Applied Research on Air Pollution Using Nuclear-Related Analytical Techniques" with participants from 20 countries (including Australia, Bangladesh, China, India and Thailand). The present proposal is to create a new RCA programme on the same topic, which would be closely modelled on the global CRP and closely co-ordinated with it.

Objectives:

- to support the use of nuclear and nuclear-related analytical techniques (e.g. NAA, XRF and PIXE) for practically-oriented research and monitoring studies on air pollution;
- to identify major sources of air pollution affecting each of the participating countries with particular reference to ***toxic heavy metals***;
- to obtain ***comparative*** data on pollution levels in areas of ***high pollution*** (e.g. a city centre or a populated area downwind of a large pollution source) and ***low pollution*** (e.g. rural areas);
- to identify one or more suitable ***biomonitors*** of air pollution with potential regional application (e.g. moss or lichen) with a view to using them for ***general monitoring*** throughout the country or region.

Expected Benefits:

- improved capability to make high quality measurements of specific air pollutants;
- information on pollution levels in areas of high and low pollution, and trends over time;

- information pertaining to pollution source identification and apportionment (based on statistical analysis of multi-parametric data) including identification of anthropogenic sources (e.g. coal and oil combustion, industry), biogenic sources (e.g. forests) and other natural sources (e.g. soil, marine);

- information on the long-range trans-boundary movement of air pollutants.

Proposed Work Plan

First year

1. Setting up of standard air samplers for collection of airborne particulate matter (APM) and comparison with local samplers;
2. Collection of APM samples from selected urban environments
3. Identification and testing of potential biomonitors of air pollution
4. Validation of analytical techniques

Second year

1. Collection of APM samples from rural and industrial environments
2. National collection campaign for biomonitor samples
3. Sample analysis and quality control
4. Database creation and start of statistical evaluation

Third year

1. Completion of sample collection and analysis
2. Data evaluation and reporting
3. Project performance evaluation

Proposed budget

Year 1:	US$ 65,000	(13 contracts at $ 5,000 each)
	US$ 30,000	Research Co-ordination Meeting
Year 2:	US$ 65,000	(13 contracts at $ 5,000 each)
Year 3:	US$ 65,000	(13 contracts at $ 5,000 each)
	US$ 30,000	Research Co-ordination Meeting
Total:	**US$ 255,000**	

126v.

Project Title and Number: THE DIAGNOSIS OF HEPATITIS B (HBV) INFECTION BY RADIOIMMUNOASSAY (RIA) (RAS/6/018)

Project Description: The project aims at the creation of a local and as far as possible indigenous capability to detect a selected panel of HBV markers by RIA methods in serum. Following the establishment of bulk reagent based methodology, the studies will be directed towards population groups considered to be at high risk such as pregnant subjects, blood donors and health care personnel. Project inputs consist essential of provision of reagent supplies and a training programme which focuses on the local production of the primary reagents required.

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

Project Officer: R.D. Piyasena

Major Activities and Achievements in 1993: The most important achievement was a change made in project direction enabling all participant laboratories to locally prepare essential components of the RIA systems that were previously supplied in the form of complete kits. A regional training course held in Beijing successfully introduced the techniques needed to link biomolecules onto solid phases and the preparation of tracers which are the most essential reagents, in respect for all the markers concerned. A meeting of national coordinators held shortly after discussed the impact of this course and took the decision that, from 1993, reagent supplies should be in the new format of primary materials in bulk form for local transformation into working reagents, thus reducing the cost of the assays considerably.

In addition to the above, most participant countries have already progressed to the second phase of the project and are investigating subjects from the high risk groups as described above.

Work plan for 1994: From a technical viewpoint, the next year of the project will see a shift of emphasis from methodological to clinical studies with screening programmes applied on as wide a scale as possible. A regional training course will concentrate on production techniques for sophisticated reagents not covered at the course in Beijing, such as monoclonal antibodies. A meeting of national coordinators at which both technical and clinical results will be presented for expert evaluation is also planned for the end of the year.

RDP/mf
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P r o s p e c t u s

Title:	REGIONAL (RCA) TRAINING COURSE ON THE PREPARATION OF BASIC REAGENTS FOR THE RIA OF HEPATITIS B MARKERS
Place:	China Institute of Atomic Energy, Beijing, China
Date:	26 April - 7 May 1993
Deadline for nominations:	15 January 1993
Organizers:	International Atomic Energy Agency in co-operation with the Government of China through the China Institute of Atomic Energy
Language:	English
Participation:	The training course is open to 20 participants from countries participating in IAEA Regional Project RAS/6/018, "Diagnosis of Hepatitis B by RIA" in the Asia and Pacific region.
Background and purpose of the course:	The first year of the project has seen the introduction of RIA methods for the detection and measurement of a selected panel of HBV markers in human serum using complete packages of reagents obtained from a regional source. The methods have gained general acceptance and clinical studies directed towards identified high risk groups such as pregnant subjects and blood donors have been initiated. The essential purpose of the training course is to take the project to the next stage, from a methodological viewpoint, by introducing participants to techniques which will enable the local preparation of individual constituents of the RIA systems being used from primary reagents obtained in bulk form. Measures required to characterise such reagents and ensure the quality and analytical reliability of assays that depend on their use will also be taught. There will be some exposure to epidemological concepts and the clinical applications of the assays for the various markers concerned.
Nature of the course:	The course will be conducted by international experts, IAEA staff members and local lecturers. There will be lectures on the linkage of biomolecules to solid phases, radiolabelling techniques, the purification of antigen and antibody labels, monoclonal antibody production, stability and storage of labelled compounds, principles of good production practice, epidemology, and clinical applications. The practical classes, towards which the course will bear a heavy orientation, will focus on linkage of antigens and antibodies onto solid phases, radiolabelling and purification, production of reference sera, and actual assays using reagents made during the course. Time will also be allowed for discussion sessions.

Participants' qualifications: As the course will be held at a "Train-the-Trainers" level, candidates should be laboratory managers, or senior technicians from laboratories already participating in the project RAS/6/018, and well placed to organise follow-up training at a national level. Some experience in production methods for primary RIA reagents, obtained, for example, by participation in the previous project RAS/6/011 "RIA of Thyroid Related Hormones", is desirable. Candidates who are presently preparing reagents for RIA of thyroid related or other hormones or analytes would have preference.

Application procedures: Nominations should be submitted in duplicate on the standard IAEA application forms for training courses. Completed forms should be endorsed by and returned through the official established channels (Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). It is strongly advised that nominations be made in consultation with the national co-ordinator for project RAS/6/018 in each country, so as to ensure adherance to participants' qualifications as detailed above. Nominations must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, by 15 January 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

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

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

The IAEA will pay the full cost of the participants' air travel from their home countries to Beijing and return. During their attendance at the course, participants will receive from the IAEA a stipend sufficient to cover the cost of their accommodation, food and incidental expenses.

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

Project title and number RADIATION STERILIZATION OF TISSUE GRAFTS (RAS/7/003)

Project description On successful implementation during the first phase (1988-1992) of the RCA project objective on radiation sterilization of human tissue allografts for intended clinical use in reconstructive surgical repair of damaged-tissue-related disabilities in the developing Member States of the Asia and Pacific region (RCA), the current project year of 1993 heralds the beginning of the second phase of project RAS/7/003. The prime emphasis of the second phase, as elucidated in the August 1992 Project Formulation Report, has been on, respectively,

(i) implementation, including guidance and expert advice from the advanced RCA Member States Australia and Japan, of the total quality system in the production of clinical radiation-sterilized tissue grafts (through adherence to relevant technical and technological criteria stipulated in international standards and guidelines based on GMP and GRP protocols);

(ii) harmonization of the tissue graft protocol items as recognized to prove best suited for the local conditions of the RCA Member States (i.e. RCA regionalization of tissue banking procedural manuals); and

(iii) help facilitate the build-up of much-needed trained technical tissue banking manpower infrastructure in the RCA Member States, with concomitant sustenance of total quality in clinical tissue grafts through the introduction of a duly-designed and monitored open-learning programme.

Added to that stated above and in keeping with possible convergent aims of widening of the health-welfare scopes of tissue banking of radiation-sterilized grafts, the project RAS/7/003 activities have further focussed (and continue to do so) attention on an active operational complementary collaboration for relevant medico-technical expertise-sharing with, respectively, the European Association of Tissue Banking (EATB); the American Association of Tissue Banking (AATB); and the Asia and Pacific Association for Surgical Tissue Banks (APASTB). These aspects of the project RAS/7/003 focus are duly reflected in the activities and achievements during 1993, for which narratives follow in later sections of the report.

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

Project Officer R. Mukherjee

Major activities and achievements in 1993

1. The First Expert Advisory Group Meeting (EAGMI) at IAEA Headquarters, Vienna, Austria, in February 1993

2. The Second Expert Advisory Group Meeting (EAGMII) in conjunction with EATB in Athens, Greece, in May 1993

3. RCA Workshop on Total Quality Systems for Tissue Banking of Radiation-sterilized Surgical Grafts, in Jakarta, Indonesia, in August 1993

4. RCA Workshop on Radiation Sterilization of Tissues -An Open Learning Programme, in HoChiMinh City, Vietnam, in November 1993

Through these activities during 1993 drafts on, respectively, Quality Manual for Tissue

Procurement and Quality Manual for Tissue Processing, have been prepared with relevant technical inputs from the end-user RCA Member States. The contents of the draft manuals along with the inputs by RCA country reports have in turn provided scientific and technical materials in the ongoing multimedial preparations of multitopical and multidisciplinary teaching modules for the open-learning programme.

Timetable for planned activities (tentative) in 1994

1. Expert Advisory Group Meeting (EAGM) in conjunction with the APASTB Conference, in Suzhou, China, in May 1994

2. Regional Training Course (RTC) on Open-learning Techniques Applied to Radiation Sterilization for Tissue Grafts, in conjunction with item 1., in Suzhou, China, in May 1994

3. National Co-ordinators Meeting (NCM) to agree on regional guidelines, in (tentative) August 1994

4. Expert Advisory Group Meeting (EAGM) in co-operation with EATB, AATB, and APASTB, at IAEA Headquarters, Vienna, Austria, in October 1994

RMukherjee/dw
1993-10-27

Prospectus

Title: REGIONAL (RCA) WORKSHOP ON TOTAL QUALITY SYSTEMS FOR TISSUE BANKING OF RADIATION-STERILIZED SURGICAL GRAFTS

Place: Tissue Banking Centre, Centre for Applications of Isotopes and Radiation, National Atomic Energy Agency (CAIR-BATAN), Jakarta, Indonesia

Date: 2 - 13 August 1993

Deadline for nominations: 30 April 1993.

Organizers: The International Atomic Energy Agency in co-operation with the Government of Indonesia through the National Atomic Energy Agency.

Language: English.

Participation: The workshop is open to 22 participants from developing RCA Member States in the Asia and Pacific region.

Background and purpose of the workshop: The objective of the Phase II of the RCA Project on Radiation Sterilization of Tissue Grafts is to establish a regionally harmonized programme for the promotion and the safe use of a Total Quality System in Tissue Banking for Asia and the Pacific. One particular output is to establish a regional network for project monitoring and dissemination of technical information. This workshop will contribute with information on Quality Control (QC), Quality Assurance (QA), Good Management Practice (GMP) and Good Radiation Practice (GRP). This workshop will also promote such aspects as: harmonized regional guidelines for tissue procurement processing; irradiation for sterilization; and microbial bio burden reduction to help attain the desired sterility assurance level (SAL of 10^{-6}). Emphasis will be given to the technical validation of these constituent techniques and methods which are either currently applied or planned to be introduced in the different tissue banks of RCA Member States. Where feasible, total quality methodology will need to be applied in the guidelines for both production of tissue grafts as well as their performance and there will need to be a systematic quality evaluation for improvements in clinical surgical behaviour and performance. Acceleration in establishing the much-needed trained manpower in this area will be carried out through a "train-the-trainers" programme supported by quality training materials and syllabi relevant to the appropriate national context. The Distant and Open Learning Systems backed by well-designed training support materials (kits, and display materials) will be aimed at providing teaching materials which can be effectively used supported by the services of experts in the field. The workshop through the interaction of the overseas experts and its participants will help in the design of such future teaching aids.

Nature of the workshop: The workshop will consist of expert lectures, reviews and discussions, and will include displays of processed grafts; choice of packaging materials; quality assessment techniques; mathematical as well as microbiological criteria for sterilizing dose-setting and sterility safety assurance estimations; the criteria for non-destructive assessment of tissue grafts and adaption, as applicable, after formulation of the related ISO/TC guidelines on "Medical Equipment of Infrequent Batch-Mode Production". The workshop topics will focus on: GMP; GRP; and those criteria for comprehensive guidelines on regionally-harmonized tissue banking, which will help support the QC and QA aspects relevant to the radiation-sterilized grafts for surgical use.

Participants' qualifications: The workshop is regarded as being at an advanced level and thereby necessitates participants having adequate background and experience in the component technical fields of tissue banking with emphasis on QA and QC.

Application procedure: Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 30 April 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

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

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

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

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

P r o s p e c t u s

Title:	REGIONAL (RCA) WORKSHOP ON RADIATION STERILIZATION OF TISSUES: AN OPEN LEARNING PROGRAMME
Place:	University Training Centre, Centre for Bio-Medical Physics, Ho Chi Minh City, Viet Nam
Date:	15 - 26 November 1993
Deadline for nominations:	31 July 1993
Organizers:	The International Atomic Energy Agency in co-operation with the Government of Viet Nam through the Centre for Bio-Medical Physics
Language:	English
Participation:	The workshop is open to 22 participants from developing RCA Member States in the Asia and Pacific region.
Purpose and background of the workshop:	The purpose of the workshop is to train and certify technicians/operators in the application of Regional Guidelines. This workshop will contribute by presenting the content developed in the training programme on Operation and Management. The workshop will promote agreement in the procedures involved in Operation and Management. It will consider the training needs of staff in the tissue banks and how best to meet those needs so that harmonization in skills and practices can be promoted. In the development of the training programme, the workshop will look at how trainers could be supported and how an Open Learning programme could be managed across the region. Acceleration in establishing the much-needed trained manpower in this area will be carried out through a "train-the-trainers" programme supported by quality training materials and syllabi relevant to the appropriate national context. The Distant and Open Learning Systems backed by well-designed training support materials (kits and display materials) will be aimed at providing teaching materials which can be effectively used supported by the services of experts in the field. The workshop will, through the interaction of the foreign lecturers and its participants, help in the design of such future teaching aids. The workshop will consist of lectures by foreign experts, reviews and discussions. Participants will be expected to present current practices within their own banks. The workshop will focus on the areas of Management, Procurement, Buildings and Design, Processing and sterilisation, and Utilisation, and the management of the Open Learning programme.

Participants' qualifications:

Because of the need to be fully integrated in the delivery of the Open Learning programme in their respective countries, candidates should be the National Co-ordinators for the RCA Project on Radiation Sterilization of Tissue Grafts.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 July 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

Language certificate:

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

Administrative and financial arrangements:

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

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

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

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Annex 11

INTERNATIONAL ATOMIC ENERGY AGENCY
INTEROFFICE MEMORANDUM

TO: Mr. J. Easey
RCA Coordinator

DATE: 1994-01-14

FROM: G. Nair
Nuclear Medicine Section
RIHU

YOUR REF:

EXT.NO.: 1670/1671

SUBJECT: Inputs for the annual report 1993 on RCA activities in Nuclear Medicine
Mr. G. Nair - Technical Officer

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

This CRP is completed in 1993. The last and final RCM was held in Bombay, India, 9-11 December 1993 to review the work done during 1992-93. The highlight of the research work done during the year under review is the conclusion that lung function is altered in normal healthy non-smoking subjects as a result of atmospheric air pollution in the metropolitan cities of RCA Member States. This is the first time that a quantitative parameter is available to indicate the effect of environmental pollution on human physiology. Also, a monograph on radioaerosol lung imaging will come out in print in the spring of 1994. This monograph is based on the materials collected during the past five years of work under this CRP.

2. CRP E1.30.06. Evaluation of Imaging methods for the diagnosis of liver diseases in developing countries.

This CRP is completed in 1993. The last and final RCM was held in New Delhi during 29 January to 2 February 1993. The final conclusions from the studies conducted under this CRP are as follows:

a. Gray scale ultrasonography is better than radionuclide scintigraphy for the diagnosis of space occupying lesions in liver such as hepatocellular carcinoma, benign cysts, benign nodules and abscesses. Radionuclide scintigraphy is better for the diagnosis of diffuse hepatic diseases like cirrhosis and fatty degeneration of liver.

b. There is a wide variation on the quality of performance of imaging equipment i.e. gray scale ultrasound and Anger gamma camera used in the study. Also, there is wide variation of skills of image interpretation and learning exposure to various liver pathologies among the clinicians who took part in this research. The former did not influence the diagnostic accuracy of liver diseases as much as the later did.

c. Work is in progress to publish an atlas of liver imaging based on the materials collected so far.

3. Technical Cooperation project RAS/6/022 strengthening nuclear medicine in RCA Member States.

No substantial progress has been made in this project during the year 1993, except that a subcontract is given to ANSTO, NSW, Australia to produce distance learning course materials for Nuclear Medicine.

GNair/mf

GNair/la 1670

324-E1.30.05 1670

1994-01-14

Dear (RCA Coordinators, as per attached sheet)

This is an appropriate time, as the new year begins, to bring to your notice a small but significant observation related to an environmental issue of high public health concern. The issue is urban air pollution and its impact on human lungs. The observation outlined below is the result of the concerted efforts of distinguished medical scientists from ten RCA member states (list attached) who took part in the IAEA initiated coordinated research programme "Radioaerosol inhalation imaging in the diagnosis of respiratory diseases in developing countries" during the period 1988-1993. In 1992-93, this unique group of distinguished scientists, unique in having indepth and standardised expertise in using a nebuliser developed by the Bhabha Atomic Research Centre (BARC), Bombay, India, examined the effect of urban air pollution on human lungs.

The group studied about 218 normal , nonsmoking, healthy, adult subjects who live in the cities of Dhaka, Beijing, Bombay, Bandung, Sendai, Seoul, Lahore, Manila, Singapore and Bangkok using a very simple, safe and inexpensive nuclear medicine technique called radioaerosol inhalation scintigraphy. The index of lung function examined was the half clearance time of inhaled radioaerosol of 99mTcDTPA (T1/2 in minutes) from lungs using a gamma camera and computer system. The T1/2 obtained from the subjects in each city was analyzed with respect to the air pollution data from the same city.

The results of this analysis showed that there is an indication of altered lung function with respect to concentration of air pollutants in the ambient air. T1/2 decreased as the pollution level increased. This effect was better seen with respect to the concentration of total suspended particles (TSP), the air pollution that has the most serious impact on public health. It was reasonable to assume that this altered lung function (and possibly lung injury) is the result of ambient air pollution, as these subjects are otherwise healthy non smoking adults. This may be an early warning sign of potential health hazard.

The data was small, hence low in statistical significance. To improve the statistical significance of the data, the group has decided to continue the studies on sets of subjects exposed to different air quality (urban vs rural) within the same country. Considering the public health and socioeconomic impact of meaningful results from such studies, the individual scientists engaged in this research

deserve support from the respective government agencies. The group also deserves support from regional bodies like the RCA. This is the first time a quantitative method of testing the effect of environmental pollution on the human physiology is available. It is all the more commendable that this happened as a result of concerted and coordinated effort of many scientists from different countries from a region which is increasingly threatened with air pollution, the bane of urban living. This group has also brought out a monograph, based on the past five years of research, on the subject of aerosol lung imaging. This will come out in print in the spring of 1994.

It is hoped that you will provide all possible support, both to the individual scientist and to the group as a whole, so that studies in this direction can be taken further to its logical conclusion.

With best wishes for a Happy New Year

Yours sincerely,

G. Nair, M.D.
Head, Nuclear Medicine Section
Division of Human Health

Attachment: List of scientific chief investigators

LIST OF PARTICIPANTS

Coordinated Research Programme on
Radioaerosol inhalation imaging for the diagnosis of respiratory diseases
in the developing countries

1. Dr. Kamaluddin Ahmed
Institute of Nuclear Medicine
Bangladesh Atomic Energy Commission
P.O.Box 158
Ramna, Dhaka
BANGLADESH

2. Dr. Johan S. Masjhur
University of Padjadjaran
School of Medicine
Jalan Pasirkaliki 190
Bandung 40161
INDONESIA

3. Dr. Y.W. Bahk
Kangnam St. Mary's Hospital
Catholic Univ. Medical College
Seoul 135
REPUBLIC OF KOREA

4. Dr. Juan F. Torres
Dept. of Medicine
Faculty of Medicine and Surgery
University of Sto. Tomas
Manila
PHILIPPINES

5. Dr. Varachee Buachum
Chulalongkorn University
Faculty of Medicine
Rama IV Road
Bangkok 10330
THAILAND

6. Dr. Toyoharu Isawa
Tohoku University
Research Institute for Chest Disease and Cancer
4-1 Seiromachi, Aoba-ku
Sendai,
JAPAN

7. Dr. Magbool Ahmed Shahid
Institute of Nuclear Medicine and Oncology
P.O.Box 53
New Campus Road
Lahore,
PAKISTAN

8. Dr. Felix Sundram
Singapore General Hospital
Nuclear Medicine Department
Outram Road
SINGAPORE 0318

9. Dr. A.M. Samuel
BARC
Radiation Medicine Center
c/o Jerbai Wadia Road
Parel, Bombay 400 012
INDIA

10. Dr. Chien Chou
Peking Union Medical College Hospital
Chinese Academy of Medical Sciences
Peking Union Medical College
Beijing
CHINA

325-E3-RC-445.3

1666
1994-01-06

Dear Mr.,

I have the pleasure of inviting you to attend the final Research Co-ordination Meeting (RCM) on the IAEA co-ordinated research programme (CRP) entitled "Computer-assisted planning and dosimetry in the radiotherapy of carcinoma of the uterine cervix in the Asia and Pacific region (RCA)" which will be held at the Department of Therapeutic Radiology, Korea Cancer Centre Hospital (KAERI), 215-4, Gongneung-Dong, Nowon-Ku, 139-240 Seoul, Republic of Korea, Tel. 974-2501, Facsimile 978-2005, from 28 to 30 March 1994.

The purpose of the meeting is to review and evaluate the progress made under the above-mentioned CRP and to prepare a final report to the Agency on the results obtained under the CRP. Since we expect to publish your work in an IAEA technical document (TECDOC), it is strongly recommended that you submit your manuscripts and illustrations in a camera-ready form, both in hard-copy form (two copies) and also on a Wordperfect 5.1 diskette. The manuscripts must follow the instructions for authors as attached. Please note that you are allowed up to forty minutes for your oral presentation. Facilities for overhead and slide projection will be available.

The meeting will be held in the English language only and no interpretation will be provided.

I wish to extend to you, as the Chief Scientific Investigator of Research Agreement/Contract No. .... (or one of your co-workers as your representative), a cordial invitation to participate in this meeting.

The Agency will provide you, at the meeting, with a lump sum of US$.... for the purpose of your travel ticket which you will receive at the meeting and which you will be able to cash upon returning home, whereby you wil be fully responsible for making your own travel arrangements, and for cancellation costs, if any. In addition, you will be provided with a lump sum payment in the amount of US$780 to cover your living expenses in Seoul. This lump sum has been calculated on the assumption that you stay for the whole duration of the meeting. If this is not the case, it is understood that you will reimburse the Agency for the difference.

If you wish hotel accommodation to be reserved for you, please complete the attached form as soon as possible and return it, at the latest by 7 February 1994, to Dr. Seong Yul Yoo, Head of the Department of Therapeutic Radiology, Korea Cancer Centre Hospital (KAERI), at the address given above.

(Please see attached list of addressees)

Please note that compensation is not payable by the Agency for any damage to or loss of your personal property or for any illness, injury or death attributable to your relationship with the Agency under the present arrangement. However, while travelling under the authority and at the request of the Agency, you will, in principle, be covered under the Agency's insurance policy for, inter alia, permanent total disability or death up to an amount of US$100 000 and medical expenses up to an amount of US$10 000 in case of an accident related to such travel, subject to the terms of insurance policy.

I shall be glad if you would let me know at your earliest convenience whether you are able to accept this invitation.

Yours sincerely,

F. Durosinmi-Etti
Section of Applied Radiation
Biology and Radiotherapy
Division of Human Health

Clearance: J. Easey

R. Mukherjee

DIR-RILS

T. Benson-W.

A. Donà

cc J. Easey
R. Mukherjee
DIR-RILS
T. Benson-W.
A. Donà
File
Registry

FEtti/dw/1656

Final Research Co-ordination Meeting on IAEA co-ordinated research programme (CRP) on "Computer-assisted planning and dosimetry in the radiotherapy of carcinoma of the uterine cervix in the Asia and Pacific region (RCA)" (E3-RC-445.3)

to be held at the Department of Therapeutic Radiology, Korea Cancer Centre Hospital (KAERI), 215-4, Gongneung-Dong, Nowon-Ku, 139-240 Seoul, Republic of Korea, from 28 to 30 March 1994

Budget Code: 5090 5222 331 RC4453 CANCER

LIST OF PARTICIPANTS

NAME AND ADDRESS	RESEARCH CONTRACT/ AGREEMENT	AIR FARE (AS)	75% AIR FARE/ TERM.ALLOW. (US$) [ROE 12.00]	PER DIEM 195x4 = 780 US$	TOTAL (US$)
S.K. Shrivastava Department of Radiotherapy Tata Memorial Hospital Dr. Ernest Borges Marg Parel, Bombay India	6043/JN	19 500	1 330	780	2 110
C. Badri Medical School University of Indonesia Salemba 6 Jakarta Indonesia	6224/JN	21 000	1 420	780	2 200
S. Sakata Head, Physics Laboratory Department of Radiation Therapy Chiba Cancer Centre Hospital 666-2 Nitonacho Chiba-shi 280 Japan	6225/JN	9 500	700	780	1 480
N.I.A. Kizilbash Nuclear Medicine, Oncology and Radiotherapy Institute P.O. Box 1590 Islamabad Pakistan	6102/JN	19 500	1 330	780	2 110
A. Zaman Institute of Nuclear Medicine and Oncology (INMOL) G.P.O. Box No. 53 New Campus Road Lahore Pakistan	5983/JN	19 500	1 330	780	2 110
M.J. Cantiller-Calaguas Department of Radiation Therapy Reyes Memorial Medical Centre Rizal Avenue, Santa Cruz Manila Philippines	5984/JN	11 000	800	780	1 580

NAME AND ADDRESS	RESEARCH CONTRACT/ AGREEMENT	AIR FARE (AS)	75% AIR FARE/ TERM.ALLOW. (US$)[ROE 12.00]	PER DIEM 195x4 = 780 (US$)	TOTAL (US$)
Y. Skoropad Deputy Director Science Research Institute of Medical Radiology Koroliova Street 4 249020 Obninsk, Kaluga Region Russian Federation	6082/CF	48 500	3 110	780	3 890
R.S. Jayatilake Cancer Institute 38, Nelson Place Maharagama, Colombo 6 Sri Lanka	5986/JN	19 500	1 330	780	2 110
K. Tungsubutra National Cancer Institute Rama VI Road Bangkok 10400 Thailand	6808/JN	15 000	1 050	780	1 830
S. Yul Yoo Chief, Department of Therapeutic Radiology Korea Cancer Centre Hospital 215-4, Gongneung-Dong, Nowon-Ku 139-240 Seoul Republic of Korea	5985/JN			290	290
			12 400	7 310	19 710

FEtti/dw
1994-01-06

Co-ordinated Research Programme on

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

General background:

The high incidence of goitre and hyperthyroidism in Asia is a well-known clinical fact. Hyperthyroidism is a functional derangement of the thyroid, which, without therapy can cause severe emaciation, and decompensation of the heart. A variety of tests for diagnosis of thyroid morphology and function are usually available involving radioisotopic as well as non-radioisotopic techniques. For therapy of hyperthyroidism, there are three main methods, medical, surgical and I-131 treatment. Out of them, iodine-131 therapy is the most effective and continues to be widely employed. Its efficacy and safety have been repeatedly shown in long term studies. It is available and affordable to most people in developing countries.

However, despite the great number of thyroid cases in this region, choice of methods of treatment using I-131 and evaluation of results have not been standardized. Different investigators in Asia have reported individual observations in their own series of patients. Most notable are (1) smaller doses of radioiodine for control of hyperthyroidism, and (2) low incidence of post-therapy hypothyroidism. To date, there has been no systematic study of different therapeutic approaches using iodine-131, nor was there any prospective study to evaluate the efficacy and incidence of post-therapy hypothyroidism, using the smaller dose approach.

Scope and Programme goals

Multiple factors are responsible for large variation of treatment response following radioiodine therapy. Important among them include the etiology of hyperthyroid state, and the modified thyroid status due to drug therapy or surgery prior to I-131 therapy. Selection of I-131 dose is also not based on any uniform criteria. They range from empirical assessment of dose to calculation of dose based on various formulae. It is necessary to limit the variables to the minimum possible in order to render standardization meaningful and acceptable in the clinical setting. It is therefore considered appropriate to include only patients who conform to Graves' disease and for whom I-131 therapy is considered to be the most appropriate choice of treatment.

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

(1) To prospectively obtain and analyze the Asia-wide statistics on remission rate and post therapy hypothyroidism, with different approach i.e. conventional vs. small dose of I-131.

(2) To determine the effects of ethnic and geographic factors on response to I-131 therapy.

(3) To identify the most important factor(s), if any, affecting treatment response.

(4) To provide standardized protocol of I-131 treatment, to patients with Graves' disease.

Materials and Methods:

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

1. Subjects:

All hyperthyroid patients with diffuse goiter, 25-65 years old, will be screened for possible inclusion in the study. Complete history and physical examination findings are to be recorded as per designed work sheet. Thyroid weight estimation using ultrasonic thyroid volume determination and scintigraphy, and 24 hour thyroidal uptake of radioiodine and its effective half life in the gland are determined or measured prior to treatment. Diagnosis of hyperthyroidism will be confirmed by the thyroid hormone profile in each patient. Patient with nodules, single or multiple, as seen from palpation, scintigraphy or ultrasonography, will be excluded from the study.

2. Inclusion criteria are as follows:

1. Newly diagnosed hyperthyroid patients with no other serious organic diseases.
   Previously diagnosed patients on medication after at least 2 weeks of cessation.
   Recurrent disease after surgery.
2. Patients with written informed consent.

Excluded are patients with nodular goiter, malignancy, critically ill, lactating or pregnant patients as well as patients who get pregnant during the study period. Patients who had received radioiodine therapy previously are also excluded from this study.

At least 50 patients definitely diagnosed to have hyperthyroidism and who fulfil the above criteria shall be included in 1st and 2nd year of the project by each participating country.

3. Biochemical parameters:

All patients on entry to this study will have baseline tests which include: serum T3, T4, TSH, by radioimmunoassay, 24 hour thyroidal radioiodine uptake, thyroid scintigraphy, thyroid ultrasound and any or all of thyroid antibodies in serum namely, anti-thyroglobulin, anti-microsome, thyroid stimulating (LATS) and blocking antibodies.

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

4. Treatment:

Single dose treatment shall be employed. Randomised allocation of treatment with either conventional or small dose of I-131 to patients will be made. To patients in Group A, a dose of I-131 equivalent to an absorbed dose of 50-60 Gy will be given. The second group (Group B) will receive a higher dose of 80-90 Gy. With patients ascribed to either of the two groups as above, the dose of radioiodine to be administered may be calculated from the following formula.

Dose of I-131 in mCi = W x D / 17 x EHL x TUR

W = estimated weight expressed in gram of the thyroid gland from scintigraphic and ultrasonic image by a standardised method
D = anticipated absorbed dose in rad
EHL = effective half life of I-131 (using a tracer dose, expressed in unit of day) in the thyroid gland
TUR = 24 hour thyroidal uptake expressed as a ratio of administered dose.

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

5. Follow-up:

Clinical evaluation of patients and testing of biochemical parameters (T3, T4, TSH) will be done one month after treatment. Repeat testing of biochemical parameters will be done in the 3rd month, and in the 6th month. After that clinical and laboratory testing will be done every six months up to at least 36 months, and if possible for a longer period.

7. Evaluation of results:

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

Participating institutions

The above measures require that the institutions which propose to participate in this CRP should have the following:

1) A nuclear medicine service with a qualified nuclear medicine physician who has the license to treat patients with hyperthyroidism using I-131.

2) The nuclear medicine service should be capable of doing thyroidal scintigraphy, thyroidal uptake study and effective half life measuring using radioiodine; the laboratory should also have capability of doing radioiodine therapy.

3) A biochemical and in vitro assay laboratory should be available for measuring biochemical parameters of patients who are included in this CRP.

4) Access to ultrasound examination of thyroid.

It will be necessary to have a sufficient number of eligible patients treated within a period of the first two years.

This would mean that the endocrine clinic of the participating institutions should be caring for a large number of hyperthyroid patients. The information as to the number of such patients who had been treated in the endocrine clinic or nuclear medicine department in the last two years will be useful.

This information and the others as mentioned earlier must be reflected clearly in the research proposal application that will be submitted to the Agency for participating in this CRP. Absence of clear information on these will render the evaluation of the proposal difficult.

Duration of CRP

This CRP is scheduled to commence from the first quarter of 1994 and will have a duration of five years, which may be extended if absolutely necessary.

First year:
(1994)

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

Second year:
(1995)

1. Continuing screening and inclusion of patients
2. Performance of required RIA tests
3. Administration of appropriate therapy according low dose and high dose groups
4. Regular follow up of patients treated earlier as per the protocol.
   (Research Co-ordination Meeting I)

Third year:
(1996)

1. Continuing screening and inclusion of patients by the required number of patients
2. Performance of required RIA tests
3. Administration of appropriate therapy according low dose and high dose groups
4. Closely supervised follow-up:
   (a) Clinical evaluation recorded on follow-up forms
   (b) RIA testing
5. Evaluation of immediate results
6. Preparation of preliminary report

Fourth year:
(1997)

1. Closely supervised follow-up:
   (a) Clinical evaluation recorded on follow-up forms
   (b) RIA testing
2. Collection and collation of data
3. Evaluation of results
   (Research Co-ordination Meeting II)

Fifth year:
(1998)

1. Closely supervised follow-up:
   (a) Clinical evaluation recorded on follow-up forms
   (b) RIA testing
2. Collection and collation of data
3. Evaluation of results
4. Preparation of comprehensive report and recommendation.
   (Research Co-ordination Meeting III)

Future - Phase II of this study if approved:

1. Long-term follow-up:

   (a) clinical evaluation
   (b) RIA testing

2. Preparation of concluding report and recommendation

Project Title: MAINTENANCE OF NUCLEAR INSTRUMENTS
Project RAS.4.008

Project officer: Y. Xie, Nuclear Medicine Section

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

Project Objectives:

The main objective of the project is to strengthen the technical infrastructures of nuclear research and applications in the region by improvement of nuclear instrumentation maintenance and repairs. It is requested to enhance national and regional training efforts and to establish a modality for responding urgent requests in connection with maintenance support which can not be met from local budget. It is also requested to integrate preventive maintenance with quality control for key nuclear instruments in order to ensure their optimum operation as well as normal working condition. The project RAS.4.008 was planned to collaborate with relevant CRPs e.g. Quality Control of Advanced Nuclear Medicine Equipment in Asia and Care and Maintenance of Nuclear Medicine Equipment in Asia from the beginning. Now, the project is going to strongly support the newly approved CRP on Research and Certification of Quality Control and Preventive Maintenance of Instruments in Nuclear Medicine Centres in Asia.

Major Activities in 1993

1. Working Group Meeting on proper selection of protective devices for nuclear instruments, BARC, Bombay, India, 29 March - 9 April 1993. The meeting worked out a procurement manual on the same subject. The manual gives guidelines for improvement of electrical environment of vulnerable nuclear instruments as well as some useful information about commercially available protective devices.

2. Consultants' Meeting on development of audiovisual teaching materials for very important aspects of nuclear medicine instrumentation, Vienna, 24-28 May 1993. The meeting thoroughly studied the requirements of audiovisual teaching materials in nuclear medicine and identified major subjects for which audiovisual materials and computer aided learning are most suitable to present. The meeting proposed to start a new CRP on computer aided learning software and a regional TC project (1995-98) to produce the requested audiovisual teaching materials for personnel training in nuclear medicine. At the moment, the RCA project "Distance Education for Technologists in Nuclear Medicine, RAS.6.022" is badly in need of such teaching materials.

3. Co-ordination Meetings on upgrading of analogue gamma cameras with IBM PCs and relevant software, Ljubljana, Slovenia, and Vienna, August 1993. The software development group and hardware development group of the programme met together and reviewed the progress in the past year. They prepared data acquisition protocols and discussed preparation of the relevant regional workshop in Malaysia in 1994.

4. Regional workshop on troubleshooting and repair of gamma cameras, BARC, India, 30 Aug. - 24 Sept. 1993. The workshop emphasized on practice on two available gamma cameras. A new approach of integration of quality control with preventive maintenance was explored and successfully implemented throughout the workshop. The workshop also produced a software "Gamma Camera Simulation' which all participants liked very much and could be widely used for personnel training in nuclear medicine if the software is further improved. It was strongly recommended to repeat the workshop in 1995 and to upgrade it from regional to interregional level in 1996.

5. Regional planning meeting on quality assurance, Dhaka, Bangladesh, 28 November - 2 December 1993.

6. An advanced workshop on quality control and SPECT was held in Guangzhuo, China in June 1993. Lectures and practical sessions conducted by an outside expert and a number of local experts were well received by 30 participants from southern part of China. After a series of national training workshops supported by the project, China has obtained the capability of supporting itself in relevant trainings and able to catch up with other RCA countries in this field.

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

Proposed activities in 1994:

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

1. Regional workshop on protection of nuclear instruments, Quezon City, Philippines, 2-20 May 1994.

2. Regional workshop on upgrading of analogue gamma cameras with IBM PCs and relevant software, Kuala Lumpur, Malaysia, 5-23 September 1994.

3. Regional workshop on data transfer and software phantoms, Bangkok, Thailand. 1 week in December 1994.

YXie/mf
/ras4008.ann

Prospectus

Title:	REGIONAL (RCA) WORKSHOP ON TROUBLE SHOOTING AND REPAIR OF GAMMA CAMERAS
Place:	Bhabha Atomic Research Centre (BARC), Bombay, India.
Date:	30 August - 24 September 1993
Deadline for nominations:	31 May 1993.
Organizers:	The Government of India through the Bhabha Atomic Research Centre, in co-operation with the International Atomic Energy Agency.
Language:	English.
Participation:	The workshop is open to 15 participants from developing RCA Member States in the Asia and Pacific region. Participating countries are encouraged to submit more than one applicant to provide scope for IAEA final selection.
Purpose of the workshop:	The purpose of the workshop is to provide participants with advanced training and practical experience in the service and maintenance of advanced nuclear medicine equipment, especially, gamma cameras, fundamentals of gamma camera imaging, measurements of performance parameters. The workshop will include circuitry explanation and analysis, trouble shooting and practice. Coverage of preventive maintenance, quality control procedures, computer applications and upgrading of analogue gamma cameras with PCs will also be included. Efforts will be made to provide vendor-specific tutorials so that participants receive practical training relevant to their own needs. The aim of the workshop is also to provide individuals with background knowledge and practical experience which will permit them to provide the first line service and maintenance of gamma cameras more effectively.
Participants' qualifications:	Candidates should have qualifications in a relevant scientific discipline with previous practical experience in maintenance of nuclear instruments. Preference will be given to candidates who routinely carry out maintenance or quality control practice of nuclear medicine equipment in nuclear research centers or nuclear medicine centers, and who are in a position to provide training to others (technicians, engineers or technologists) on a national basis.
Nature of the workshop:	The workshop will consist of didactic lectures combined with practical sessions where each candidate will be expected to work independently in service and maintenance of very sophisticated gamma cameras.

The contents of the workshop will include demonstrations and practicals in the following subjects, as well as hospital visits:

- Introduction to gamma cameras
  - Principles of operation
  - Basic functional blocks

- Fundamentals of gamma camera imaging
  - Gamma camera head and collimator
  - Analog signal Processing Unites
  - Generation of Energy and Position information
  - Image Display Equipment

  - Computer Interface

- Performance Parameters
  - Uniformity (Energy, Spatial response)
  - Spatial Linearity (Integral and Differential)
  - Spatial Resolution (Intrinsic and Extrinsic)
  - Countrate
  - Sensitivity

- Methods for Performance Evaluation

- General problems and Failure Mechanisms

- Preventive Maintenance strategies

- Quality Assurance and Control Procedures
  - Acceptance and Reference Testing
  - System Operational Checks
  - Physical and Software Phantoms

- Allied Equipments and Procedures
  - Dose Calibrator
  - Radio-pharmaceuticals
  - Test and Calibration Equipments for Quality Control

- Upgradation of Analogue Gamma Cameras using Personal Computers
  - Digital image acquisition and Processing
  - On-line and off-line corrections on acquired image data
  - Static and Dynamic Imaging
  - Image Processing and analysis

- Computer System in Gamma Camera Imaging
  - System Organisation
  - Sotrware for clinical evaluation and Quality Control

- Basics of Single Photon Emission Computed Tomography (SPECT)
  - Principle of operation
  - Tomographic Reconstruction Techniques
  - system Performance Parameters
  - Quality control

- Computer aids in Preventive Maintenance and minor repair

- Case studies of trouble shooting and Quality Control of Gamma Camera.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 May 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

A copy of the nomination form along with the attached completed Personal Data Sheet duly filled should also be sent to the Coordinator of the Workshop at the address given below:

Mr. B.R. Bairi
Head, Electronics Division
Bhabha Atomic Research Centre (BARC)
Trombay
Bombay 400 085
India

Telex: 011-71017 BARC IN
Phone: (91) 22-556 3060, ext.: 4306 or 2010
Fax: (91) 22-556 0750

Language certificate:

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

Administrative and financial arrangements:

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

Participants will be provided with air travel from their home countries to Bombay and return, and will be paid a stipend sufficient to cover the costs of their meals and incidental expenses.

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

P r o s p e c t u s

Title:	REGIONAL WORKSHOP ON EVALUATION OF MODERN SPECTROSCOPY AMPLIFIERS
Place:	Dalat Nuclear Research Centre, Dalat, Viet Nam
Date:	19 October - 6 November 1992
Deadline for nominations:	30 June 1992
Organizers:	International Atomic Energy Agency in co-operation with the Government of Viet Nam through Viet Nam National Atomic Energy Commission and Dalat Nuclear Research centre
Language:	English
Participation:	The workshop is open to five participants from developing IAEA Member States in the Asia and Pacific region. In addition up to three national participants will be able to attend the workshop.
Purpose of the workshop	Several of the most advanced spectroscopy amplifiers will be tested and compared with the classical amplifiers as used in nuclear spectroscopy. The characteristics and properties of these amplifiers will be studied. The resulting report will be made available to all Member States, and should allow a more prudent and appropriate selection of equipment.
Participants' qualifications:	The candidates should have extensive experience in analogue nuclear electronics, reasonable knowledge about nuclear spectroscopy and electronics testing equipment
Nature of the workshop:	The methodology for testing top quality analogue amplifiers will be developed. Eight of the most modern and advanced spectroscopy amplifiers will be tested applying the criteria defined in the first part of the workshop. Particular attention will be given to the following properties:

- linearity
- improvement in base line restoration
- pile-up rejection
- pole zero cancellation
- lifetime correction
- capability of large throughput
- longterm stability.

These characteristics will be compared with a standard Canberra 2020 spectroscopy amplifier, to compare the advances made in the last five years. The circuitry of the selected amplifiers will be studied, and the way in which specific problems were solved will be analysed. An

extensive and detailed report on the findings of the test procedures will be prepared, and the amplifiers will be compared with each other, as well as with the characteristics specified by the manufacturers.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA application forms for training courses. Completed forms should be endorsed by and returned through the official established channels (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the Office of the United Nations Development Programme). They must be received by the International Atomic energy Agency, P.O. Box 100, A-1400 Vienna, Austria, by 30 June 1992. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

Language certificate:

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

Administrative and financial arrangements:

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

The IAEA will pay the full cost of the participants air travel from their home countries to Viet Nam and return. During their attendance at the workshop participants will received from the IAEA a stipend sufficient to cover the cost of their accommodation, food and incindetal expenses.

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

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Annex 15

New Project Proposals

- Audiovisual Teaching Aid in Open and Distance Learning for Nuclear Medicine
- Air Pollution and Lung Function

INTERNATIONAL ATOMIC ENERGY AGENCY
INTEROFFICE MEMORANDUM

TO: Mr. J. Easey
RCA Coordinator

DATE: 1994-01-06

THROUGH: Mr. A. Cuaron
DIR-RIHU

FROM: Y. Xie
Nuclear Medicine Section
RIHU

YOUR REF:

EXT.NO.: 1673/1677

SUBJECT: Proposal for a RCA project "Audiovisual teaching aid in open and distance learning for nuclear medicine" 1995-98

The proposal to establish the above mentioned project was put forward by the Consultants' Meeting on Development of Audiovisual Teaching Materials on Important Aspects of Nuclear Medicine Instrumentation, Vienna, 24-28 May 1993. The meeting urged the Agency to adopt and start the proposed project in 1994 in order to cooperate with the Australian funded RCA project "Distance Education for Technologists in Nuclear Medicine" which was planned to commence at the beginning of 1993. Due to some unforeseen reasons, it has been postponed for almost one year. Considering this situation and financing mechanism of the Agency, we herewith submit this proposal for the consideration of RCA working group in spring of 1994 and request to start the project in 1995.

Thank you for your kind consideration and support.

clearance: G. Nair, Head, Nuclear Medicine Section

Att.

YXie/mf Y. Xie

Project Proposal

Title: Audiovisual teaching aids in open and distance learning for nuclear medicine

Starting date of implementation: 1994

Duration: 4 years

Background:

The scope of transfer of technologies is constantly increasing as more developing Member States acquire the potential to make use of nuclear techniques. Notwithstanding the present financial constraints, the IAEA needs to cope with rising demand for manpower development in several fields of science and technology. The need of a more efficient training mechanism is clear in this context and open and distance learning (ODL) seems to be an ideal option since the IAEA is dealing with hundreds of trainees distributed all around the world.

In developing countries, there exists an estimated number of 2,500 technologists in nuclear medicine who have not received any formal training. From these, 1,300 are in countries of the Asia and the Pacific region. These technologists are in charge of very sophisticated and expensive equipment - like gamma cameras and computers - and are also directly responsible for performing the nuclear clinical studies on patients and for the final quality of the results. The nuclear physician needs to rely on these results to reach a clinical diagnosis and to make the best clinical decision, but the results can give erroneous information if there are slight changes in technique or if there are unnoticed faults in the scintigraphic system. The outcome of patient management can depend upon the competence of the technologist.

With the availability of audiovisual teaching aids it is proposed to impart the required knowledge to the technologists in nuclear medicine adequately, so as to enable them to carry out the day to day working in nuclear medicine in a more efficient way. These audiovisual aids would be particularly useful in complementing distance education programmes such as that being developed currently for the Asian region.

Focus

Distance education of technologists is not straightforward and requires careful consideration of the skills which the participant must ultimately possess. Education materials therefore need to be designed so as to provide participants with a clear learning path with emphasis on practical issues rather than theory. Audiovisual (AV) materials, whether video tapes or computer aided learning (CAL) packages should be carefully designed with the following in mind:

a. AV materials should be used to demonstrate practical skills and to illustrate techniques which might otherwise be difficult to describe.

b. Simple theoretical descriptions may add little to textbooks unless used to emphasize

practical application or to focus on particularly difficult concepts.

c. Certain AV materials need to be company specific, e.g. instructions on how to use aparticular company's computer. While theory can be general, hands-on application must focus on the participants actual practice.

d. Throughout the training there needs to be some emphasis on problem solving rather than simply following protocols. AV material can be used to demonstrate what can go wrong and how to repair the fault.

e. AV material has the potential to make learning interesting and so has an important role in motivating the participant. The key to this is to always demonstrate relevance of theoretical subjects.

The area of instrumentation is central to the successful performance of Nuclear Medicine. Technologists need to understand the limitations of this instrumentation in order to optimise study quality. Development of AV materials which can illustrate the optimal use of instrumentation will not only enhance distance education programmes for technologists but would provide other Nuclear Medicine staff (medical and scientific) with a useful aid to understanding the important practical aspects of instrument use.

Benefits anticipated

With the implementation of this project it is anticipated that the cost of training one technologist will be considerably reduced as compared with the traditional training courses conducted by IAEA. Full potential of this project is far beyond since some training packages could be used in the training of all nuclear medicine technicians in the developing Member States (approx. 2500) with minimal needed cost. This will also be the first international attempt in standardization of nuclear medicine technology.

In developing Member States the number of gamma cameras have shown tremendous increase in the past few years and it is expected that in a period of next 3 or 4 years the total number of technologists working in nuclear medicine in developing countries could be around 5000. The traditional training courses will not be in a position to impart training to all these technologists in this short duration. The audiovisual teaching aids will cater to a larger number of trainees at any one time. In addition, the proposed training package will be more interactive with the trainees. This will enable them to learn not only the techniques of how to perform but also understand the scientific basis for performing the techniques. The interactive way of learning is widely recognized as a much better way of teaching.

The audiovisual teaching aids produced in this project can also be put into use in training physicists, service engineers, etc., provided packages are designed with due consideration to flexibility. They should be applicable for use in various programmes.

Scope of the Project

The activities for the period 1995-98 are planned in the following pages. In general, some major type of activities should play the most important roles in achieving the project objectives.

The following areas have been identified under broad headings so as to provide materials for the preparation of necessary audiovisual aids.

a. Basic sciences, radiation physics, radiation detectors and statistics.

b. Nuclear medicine instruments including gamma cameras, SPECT, computers, dose calibrators, well counters, etc.

c. QA/QC of the above mentioned instruments.

d. How to perform the various routine clinical studies in a hospital. This includes static imaging, quantitative dynamic studies and SPECT studies. The package will illustrate the various techniques and a review of theory and QC. In addition, it is envisaged that practical demonstrations of what goes wrong if proper techniques are not employed will be included.

e. Maintenance of nuclear medicine instruments for service engineers.

f. Familiarising the technologists in the use of a specific computer available with the gamma camera in their respective institutions.

In the first 18 months of this project, it is proposed that a good library set of slides explaining the theoretical knowledge, the working principles of these various nuclear medicine instruments and also the basic sciences of radiation physics, will be established.

However, necessary video tapes will be produced to demonstrate how to perform various QC procedures for gamma camera and SPECT systems and various routine clinical studies like static imaging, quantitative dynamic studies and SPECT studies of heart and brain, etc. It is also proposed to incorporate multimedia techniques (integration of image, texts, sound and animation on PC) so as to make this teaching package more flexible and interactive for the learner.

Specific Objectives

1. To establish a good set of slides explaining new procedures and advanced technology and distribute them.

2. To develop audiotapes to support these slides.

3. To produce videotapes (VT) illustrating some important and complicated procedures and practice, good and wrong images caused by correct and wrong operations, respectively.

4. To evaluate these audiovisual aids using the mechanism provided by the Australian distance education project RAS/6/022.

5. To develop CAL in the field of teaching in nuclear medicine in order to update AV and VT teaching materials, and produce self-paced and interactive learning package with which technologists can learn in front of PCs.

Workplans

By the end of 1995: Make all these audiovisual aids available including multimedia techniques of teaching. One meeting of experts for final assessment of teaching aids . Late 1995/early 1996.

1996: To implement this as a pilot study in South East Asian region in collaboration with the Australian distance education project.

1997: Evaluation of these teaching aids (mainly audiovisual). Development of the necessary software for multimedia to be more effective in producing self-paced and interactive learning package as well as teaching materials.

1998: Evaluation of these multimedia techniques for ODL with special reference to nuclear medicine technology of technologists.

Project Costs and Timetable

A possible timetable, needs and costs for production of this material were considered.

1995	- **theory:**	selection and collection of existing slides and tapes (meeting)	US $	22,000.-
		multimedia based CAL development (South Bank University)		23,000.-
	- **QC:**	VT production (Institute for Biomedicine, Vienna)		25,000.-
	- **clinical methods:**	multimedia based CAL development (RPAH, Sydney)		30,000.-
		Sub-total	**US$**	**100,000.-**

1996:	- **theory:** animation methods based on multimedia to vividly explain theory		30,000.-
	- **contingency:** e.g. purchase of existing materials		20,000.-
	- **production costs:** for further VT (QC and clinic methods)		50,000.-
	Sub-total	**US$**	**100,000.-**

Note: There will be only one meeting supported by experts funds during the period of 1995-1996. The rest will be service contract with relevant institutes to produce VTs, etc.

1997:	- regional coordination meeting on ODL with AV and VT materials		25,000.-
	- media distribution (CD ROM, etc.)		30,000.-
	- quality assurance in nuclear medicine (1 tape)		30,000.-
	Sub-total	**US$**	**85,000.-**
1998:	- regional workshop on multimedia based CAL for ODL in nuclear medicine (evaluation, applications and further improvements)		30,000.-
	- media distribution (AV, VT and CAL programme on CD ROM)		25,000.-
	Sub-total	**US$**	**55,000.-**
	Total project cost	**US$**	**340,000.-**

YXie/mf
/audiovis.pro

INTERNATIONAL ATOMIC ENERGY AGENCY
INTEROFFICE MEMORANDUM

TO: Mr. J. Easey
RCA Coordinator

DATE: 1994-01-13

THROUGH: Mr. A. Cuaron
for DIR-RIHU

OUR REF: E1.30.05

FROM: G. Nair
Head, Nuclear Medicine Section,
RIHU

YOUR REF:

EXT.NO.: 1670/1671

SUBJECT: **Proposal for the support of a Research Coordination Meeting in early 1995 to consolidate the results of research on AIR POLLUTION AND LUNG FUNCTION carried out in 10 RCA Member States.**

A CRP (E1.30.05) on radioaerosol inhalation imaging for the diagnosis of respiratory diseases in developing countries was completed in 1993 with an RCM in Bombay during 9-11 December 1993. This CRP was for the RCA member states. During its final year, this research group specifically examined the effect of air pollution on lung function using the simple technique of radioaerosol inhalation scintigraphy. The preliminary results showed that there indeed was an indication of altered lung function (and possible lung injury) due to air pollution in the cities of RCA member states. The group strongly recommended to continue work on this topic in an extended manner to collect data from a large sample size to meet the requirements of statistical significance of the results. They agreed to work on this without Agency's assistance.

However, Agency's assistance is requested to convene a meeting in early 1995 to pool the data, collected by then, analyze it and draw firm conclusions. Such a meeting is not possible under the umbrella of a CRP, which stood completed in 1993. It is, therefore, requested that the proposal for support of such a meeting be placed before the next RCA working group meeting to be held in the spring of 1994 for its favourable consideration.

A copy of the travel report on the RCM which took place in Bombay, is attached as an annex. It provides detailed background information on the project.

Attachment: 1. Proposal
2. RCM Report

Gnair/la

PROPOSAL TO THE RCA WORKING GROUP

for the support of a Research Coordination Meeting in early 1995 to consolidate the results of an extended research on

AIR POLLUTION AND LUNG FUNCTION

carried out in 10 RCA member states

Scientific Background:

Rapid urbanisation is transforming Asia. Eighty seven Asian cities have more than a million inhabitants. By 2005 more than half the population of East Asia will live in cities. In South Asia, the urban population will overtake the rural population by 2025.

Rapid economic growth and industrialization have caused unacceptably high levels of pollution. Urban air pollution in a number of Asian cities is at critical levels. According to the studies of the World Health Organization, 12 of the 15 cities with the highest levels of particles in the atmosphere, and 6 of the cities with the highest levels of sulphur dioxide are in Asia. Of the 7 cities in the world with the worst air pollution, 5 are in Asia - Beijing, Calcutta, Jakarta, New Delhi and Shenyang. Levels of particles in the atmosphere, the air pollution that has the most serious impact on public health are rising in almost all Asian cities. In fact these levels have already exceeded the so called permissible or acceptable levels. Other pollutants in the urban air which are known to be injurious to human health are Sulphur dioxide, Nitrogen oxides, Carbon monoxide and other oxidants like ozone.

In 1992, the coordinated research project on "Radioaerosol inhalation imaging for the diagnosis of respiratory diseases in developing countries" (E1.30.05) specifically examined the issue of lung damage due to atmospheric air pollution. This research group was drawn from 10 RCA member states such as Bangladesh, China, India, Indonesia, Japan, Peoples Republic of Korea, Pakistan, Philippines, Singapore and Thailand. The results of this investigation were discussed and analyzed during the research coordination meeting held in Bombay during 9-11 December 1993. The results showed that apparently healthy normal adults have altered lung function as a result of atmospheric air pollution. Subjects studied from Sendai (Japan) and Singapore where the atmospheric air quality is better, had different values of a lung permeability index (T1/2 of 99mTcDTPA clearance of inhaled radioaerosol) as compared to subjects from Dhaka, Beijing, Bombay, Bandung, Seoul, Manila and Bangkok where atmospheric air quality is less than what is in Sendai and Singapore. The effect of this altered lung function was better seen with respect to the concentration of Total Suspended Particles (TSP) and Sulphur dioxide (SO_2). Although the results of the research study carried out in 92-93 do not have statistical significance due probably to small sample size, the results undoubtedly show a definite trend which has far reaching implication in a public health issue of grave concern for almost all developing countries, that is, the ever increasing ambient air pollution.

Considering the implications of these preliminary results obtained in a small sample size of the population studied, the group which has unique expertise in using radioaerosol inhalation studies using the nebuliser developed by Bhabha Atomic Research Centre (BARC), decided to continue the studies on their own to enlarge the sample size for satisfying the requirements of statistical significance of the results. But, as the research group is physically scattered in 10 different RCA member states, (although the group is a highly cohesive one

from the technology point of view), it will be necessary to meet at one place after a year to discuss and analyze the enlarged data and to draw firm conclusions. For this, the group needs support to hold a research coordination meeting in 1995. Such a meeting cannot be held under the umbrella of the CRP E1.30.05, because the CRP stands completed in 1993.

Objectives of the proposal

To hold a Research Coordination Meeting in 1995 to discuss, and analyze the data collected in 1994 by the 10 chief scientific investigators on 99mTcDTPA clearance of inhaled radioaerosol, as an extension of the work done in 1992-93.

Budgetary Requirements

1. For the Research Coordination Meeting in Bombay for 3 working days in 1995 for the 10 participants and the Agency staff

   US$ 21,000

2. For distribution of the BARC nebuliser through UNDP to the 10 chief scientific investigators. The nebuliser will be supplied by BARC, Bombay, free of cost to the Agency.

Anticipated impact of successful implementation of the proposal

If the extended study shows statistically significant results indicating that lung function is altered in normal, healthy, non smoking subjects as a result of atmospheric air pollution, it will be a step towards hazard identification which is part of risk assessment. A new emphasis is emerging in public health, that is, the shift of emphasis from prevention of disease in individuals to risk reduction for the whole population at risk. It is the result of such research that have shifted our public health emphasis to a concern about the levels of exposure to harmful environmental insults. This may help and support the evolution of public health policy on environmental air pollution.

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1994-01-12
Proposal.rca

FULL REPORT OF RCM IN BOMBAY

The purpose of the duty travel was to conduct the Final Research Coordination Meeting (RCM-RC 369.5) of the coordinated research project (CRP E1.30.05) on radioaerosol inhalation imaging for the diagnosis of respiratory disease in developing countries. This CRP was extended in 1991 for one more year with the specific purpose of examining the role of 99mTcDTPA (diethylene triamine pentaacetic acid) aerosol inhalation scintigraphy in the detection of lung injury produced by the atmospheric air pollutants usually found in the metropolitan cities of developing countries. This extension was granted based on the recommendation of this group of leading scientists who possess this unique expertise in radioaerosol inhalation scintigraphy using the nebuliser developed by the Bhabha Atomic Research Centre, (BARC), Bombay. This nebuliser was evaluated by experts in this field and was found to have optimal characteristics for use in radioaerosol inhalation studies.

All participating countries (Annex 2) were represented in this RCM by the respective chief scientific investigators (CSI) except the CSI from Pakistan who could not attend the meeting. Each CSI presented the study protocol, the results obtained, and also the air quality data from the respective city of the country. The detailed report from each country is available in the records of the Nuclear Medicine Section.

STUDY METHODS

Each CSI studied a certain number of normal non smoking subjects, who had no respiratory symptoms, had normal X-ray chests and normal spirometric pulmonary function tests. No subject with a history of smoking in the past was included in this study. The subjects studied lived in the respective city for many years, were adults with age ranging from 17-58 years and included both females and males.

Each subject underwent 99mTcDTPA aerosol inhalation scintigraphy. The method consists essentially of inhalation of the radioaerosol generated from the BARC nebuliser. About 1-2 millicurie of nebulised radioaerosol reach the lungs following five minutes of inhalation under tutored tidal breathing. The subject is then positioned under the gamma camera and sequential images of the lung are acquired for about 10-20 minutes through a computer system. Region of interest is drawn over the images of both the lungs and a time activity curve is generated. The disappearance time of half of the total lung activity at the beginning of the study, referred to as T1/2 in minutes, is determined from the best fit of the monoexponential curve during the first 7 minutes of study. Thus the method is very simple to perform, safe to the subject and inexpensive when carried out in a well established nuclear medicine laboratory.

Typically, the T1/2 represents the clearance of inhaled aerosol from the lung to the blood by crossing the alveolar lung epithelium (Fig. 1). This clearance is a function of many variables, some of which, such as position of subject, the breathing pattern, the radioaerosol particle size, the radiochemical purity of aerosol etc., can be controlled to a large extent at the time of study. It is assumed that normal, healthy lung alveolar epithelium clears the radioaerosol at a certain rate which is different from the clearance rate of the aerosol from an injured or diseased alveolar lung epithelium. The subjects in this study did not have any evidence of lung disorder on the basis of standard clinical evaluation of lung. Injury to alveolar epithelium results in faster clearance of radioaerosol giving shorter T1/2 values as compared to T1/2 values from healthy lungs.

Rapid urbanisation is transforming Asia. Rapid economic growth and industrialisation have caused unacceptably high levels of pollution. Urban air pollution in a number of Asian cities is at critical levels. According to the studies of WHO, 12 out of the 15 cities with the highest levels of particles in the atmosphere, and 6 of the cities with the highest levels of sulphur dioxide, are in Asia. Of the seven cities in the world with the worst air pollution five are in Asia - Beijing, Calcutta, Jakarta, New Delhi and Shenyang. Levels of particles in the atmosphere, the air pollution that has the most serious impact on public health, are rising in almost all Asian cities and in some of these, the levels cross the so called acceptable (permissible!) limits (Annex 3).

STUDY MATERIALS

A total of 213 apparently healthy non smoking adult subjects living for many years in the cities of Dhaka, Beijing, Bombay, Bandung, Sendai, Seoul, Manila, Singapore and Bangkok were studied. As mentioned earlier, these subjects did not have respiratory symptoms, had normal chest radiographs and spirometric respiratory function tests like vital capacity (VC), forced expiratory lung volume (FEV) etc. The T1/2 values of radioaerosol clearance from lungs using inhalation scintigraphy were determined in these subjects. The air quality data from the cities mentioned above was also collected. These data pertain to total suspended particles (TSP), Sulphur dioxide (SO_2) Nitrogen oxides (NOx), carbon monoxide and oxidants like ozone. (The data from Lahore, Pakistan is not included in the report as they are not available at the time of writing this report).

STUDY RESULTS

The T1/2 values (in minutes) of apparently normal subjects from the above mentioned cities were examined in the light of the air quality data available from the respective cities. These data were presented by participants in various units, but all these were converted to microgram/m3 units. The results of this examination showed the following.

It was a priori assumed that T1/2 is a measure of pulmonary epithelial permeability, and any variation observed may be related to the air pollution levels, as these subjects are otherwise normal, apparently healthy non smoking adults. Hence a linear correlation was attempted between T1/2 and the individual pollutants such as total suspended particles (TSPM) Sulphur dioxide (SO_2) and Nitrogen oxide (NO_2). (For other pollutants, data were not provided by most of the participants). One standard deviation in the T1/2 values obtained from subjects in each city was also taken into consideration while attempting a regression fit. The results are presented in Table 1 and Fig. 2, Fig. 3 and Fig. 4.

TABLE 1

Correlation between 99mTcDTPA clearance half life (T1/2 + S.D.) and air pollution levels in nine major cities of South East Asia

Pollutant (in microgram per sq meter)	No. of Data	CORRELATION RESULTS			
		CONSTANT[1]	QUOTIENT[2]	COEFFICIENT	STAT.SIG.
TSPM	8	70	-0.09	-0.35	p.<0.20
SO_2	7	63	-0.12	-0.22	p.<0.50
NO_2	6	62	-0.07	-0.06	p.>0.50

Note:

1) This represents a hypothetical value for T1/2 in mins. in a situation of a zero pollution level.

2) This quantifies the rate at which T1/2 value decreases per unit increase in the respective pollutant level

STUDY CONCLUSION

The following conclusions are drawn from the results obtained. Although none of the correlations seem to be statistically significant, some physical significance do undoubtedly arise out of this mathematical treatment given to the data collected from the field.

1. It is remarkable that the hypothetical values of T1/2 corresponding to zero pollution level of the three major pollutants agree reasonably well (Table 1); it does seem reasonable to say that the T1/2 in a normal healthy adult in the S.E. Asian region living in a clean environment is expected to be around 65 mins.

2. All the three pollutants have shown a negative correlation. This cannot be viewed as a fortuitous coincidence since data have been obtained from different countries independently adopting the same protocols. Thus it is reasonable to conclude that a negative effect on the T1/2 value i.e. the pulmonary epithelial permeability, is indicated for all the three pollutants.

3. The correlation coefficient and the p values indicate that the three pollutants can be arranged in the decreasing order of their effect: TSPM > SO_2 > NO_2. This is further substantiated by the correlation quotient values of 0.09, 0.12 and 0.07 obtained respectively for TSPM, SO_2 and NO_2. (Since the absolute values of TSPM are at least a factor of two higher than those of SO_2 and NO_2, the quotient value of 0.09 for TSPM can be considered as more effective than the value of 0.12 obtained for SO_2). Thus, a physical picture emerges indicating that the dust load in air affects the lung most than SO_2 concentration in the air; the NO_2 levels affect the lungs least. This result also seems to be logical and acceptable from the point of view of the physical principles involved in membrane permeabilities (it is emphasised here that most of the participants have given values for the respirable dust loads i.e. PM_{10} concentrations)

It may be noted that, if the mean values of T1/2 alone are correlated with pollution levels, then the negative correlation for TSPM and SO_2 become statistically significant at 10% and 20% levels respectively.

FUTURE SCOPE

At present there is a wide variation in the data base size available from each country. If sufficient data is made available, T1/2 values can be seggragated into at least 3 age groups viz. 20-30, 31-40 and >40; the data can also be grouped separately for the supine and sitting postures adopted by the subjects during the study.

There is also a wide variation in the air pollution data base provided by the participants. If each participant could provide annual data at least for the preceding five years, the respective air pollution level can be considered along with its standard deviation while attempting the correlation with T1/2.

The above two steps are expected to improve the statistical significance of the correlations enormously.

Lastly, if each country can identify at least 3 cities within itself with wide variations in the air pollution levels, then the negative correlation can be verified for each country separately. This will further strengthen the preliminary conclusions arrived now and eliminate any scatter due to possible regional differences in pulmonary epithelial permeability in normal healthy adults.

COLLECTIVE RECOMMENDATIONS OF THE GROUP

Needless to say that the results generated considerable excitement and positive enthusiasm among the group. Although lacking in statistical significance (probably due to small sample size), the results undoubtedly showed a trend, which has far reaching implications in a public health issue of grave concern - ambient air pollution - for almost all the developing countries. In order not to loose the momentum of the positive enthusiasm gained from this small, but significant finding, the group, which is unique in having indepth, well standardised expertise in using the BARC developed radioaerosol generating system for lung studies, recommended the following short term future steps.

1. The Agency helps to distribute one unit of the radioaerosol generating system from BARC to each CSI to continue the study and collect large sample data from the respective cities in the manner mentioned under future scope of this study.

2. The Agency helps to arrange a meeting of the CSIs in about 12 months to analyze and collate the large sample data so collected.

3. Meanwhile, the present findings will be published in an internationally reputed scientific journal after supplementing the data with a few more subjects from each city. Dr. Samuel, Dr. Isawa, Dr. Bahk, Dr. Torres and Dr. Nair are to take joint responsibility of this publication. Mr. Nambi's (head, environmental assessment division, BARC, Bombay) help will be sought for this purpose.

Agency's commitment in fulfilling this recommendations

1. Distribution of aerosol generating system through UNDP to the ten CSIs. The system will be supplied by BARC, Bombay, free of cost to the Agency.

2. Another research coordination meeting at Bombay in early 1995. (US$ 21.000)

Action contemplated

It is considered to put up a proposal to the RCA coordinators working group for support of the future study as indicated in the report when the working group meets in the spring of 1994.

Acknowledgement

The writer of this report wishes to acknowledge his deep appreciation to each participant of this meeting for his or her whole hearted support for the success of the meeting. He also wishes to profusely thank Dr. Samuel and her colleagues who played magnificent host to the meeting. Mr. Nambi's role as an active observer and his constructive help in statistically analyzing the data is gratefully acknowledged.

Note

The galley proof of the monograph on radioaerosol inhalation scintigraphy based on the work of this distinguished group during the past five years was shown to the participants by Dr. Bahk and Dr. Isawa who had edited and published this work under an Agency's technical contract. The book will come out in print in April 1994 for distribution to all concerned.

HERALD INTERNATIONAL TRIBUNE

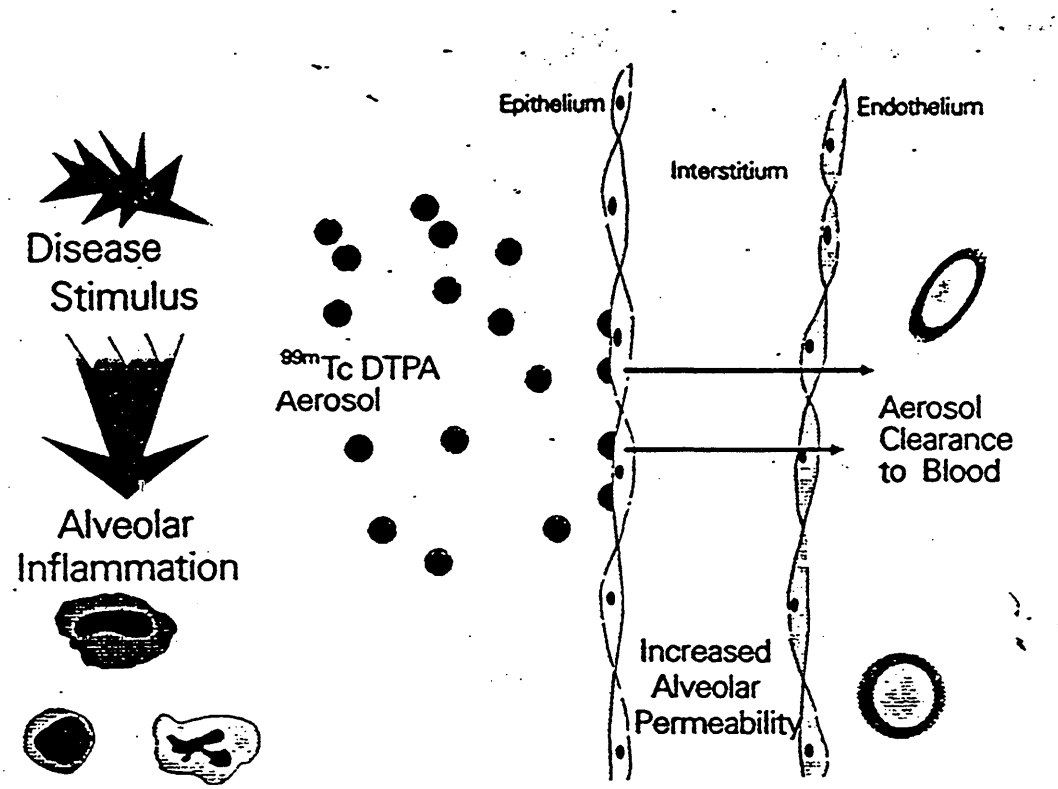
Tuesday, 4 January 1994

"AS ASIA URBANISES, POLLUTION PROBLEMS GROW EVER MORE URGENT"

"Rapid economic growth and industrialization have caused unacceptably high levels of pollution. Urban air pollution in a number of Asian cities is at critical levels. According to studies of World Health Organization (WHO) 12 of 15 cities with the highest level of particles in atmosphere and 6 of the cities with the highest level of Sulphur dioxide, are in Asia.

Of the 7 cities in the world with the worst air pollution, 5 are in Asia, Beijing, Calcutta, Jakarta, New Delhi and Shenyang. Levels of particles in the atmosphere, the air pollution that has the most serious impact on public health, are rising in almost all Asian cities".

FIG.1 CLEARANCE PATHWAY OF INHALED 99mTcDTPA AEROSOL



CRP On Aerosol Inhalation Imaging For the Diagnosis of Respiratory Diseases in Developing Countires

(DECEMBER 9-11, 1993)

.....

December 9, 1993 (Thursday)

TIME		
9.30-10.00	WELCOME	Dr(Mrs) A.M. Samuel Head, R.M.C.
	Briefing about the CRP	Dr. G. Nair, Representative of I.A.E.A.
	Inauguration	Dr. U.C. Mishra, Director, Health, Safety & Environment Group, B.A.R.C.
	Vote of Thanks	Dr. P.S. Soni
10.00-10.30	Tea	
	Reports from the participants	
10.30-11.00	Report ..	Bangladesh (Dr. Kamaluddin Ahmed)
11.00-11.30	Report ..	China (Dr(Mrs) Chien Chou)
11.30-12.00	Report ..	Indonesia (Dr. Johan S. Masjhur)
12.00-12.30	Report ..	Japan (Dr. T. Isawa)
12.30-13.00	Report ..	South Korea (Dr. Yong Whee Bahk)
13.00-14.00	Lunch	

14.00-14.30	Report ..	Pakistan (Dr. Magbool A. Shahid) Did not attend the meeting
14.30-15.00	Report ..	Philippines (Dr. Juan F. Torres)
15.00-15.30	Tea	
15.30-16.00	Report ..	Singapore (Dr. Felix X. Sundaram)
16.00-16.30	Report..	Thailand (Dr. Vacharee Buachum)
16.30-17.00	Report ..	India (Dr(Mrs) A.M. Samuel)
19.30-21.30	Dinner	

December 10, 1993 (Friday)

9.30-10.30	Discussion
10.30-11.00	Tea
11.00-13.00	Discusssion
13.00-14.00	Lunch

SEMINAR IN NUCLEAR MEDICINE

Chairperson : DR. R.D. Lele

Co-chairperson : Commd. Dr. B.N. Sharma

14.00-14.30	Guest Lecture : Dr. Y.W. Bahk, South Korea **"The usefulness of pinhole imaging in bone and joint diseases."**
14.30-15.00	Guest Lecture : Dr. T. Isawa, Japan **"Deposition patterns of inhaled aerosols in the lungs including techniques and krypton gas."**

Symposium of Radioimmunoscintigraphy and Therapy

Speakers

15.00-15.30	Dr(Mrs) Chien Chou, China **"Clinical Application of Radioimmunoimaging in the Detection of Tumours - Current Status in China".**
15.30-16.00	Dr. Kamaluddin Ahmed, Bangladesh **"Present Status of Immunoscintigraphy & Immunotherapy".**
16.00-16.30	Dr. Juan F. Torres, Jr., Phillipines **"Risk Stratification in Acute Myocardial Infarction".**
16.30-17.00	Dr. Sundaram F.X., Singapore **"Prospects for Radiolabelled Antibodies in Radioimmunodiagnosis".**

December 11, 1993 (Saturday)

9.00-10.30	Analysis of the all results
10.30-11.00	Tea
11.00-13.00	Recommendation & Suggestions
13.00-14.00	Lunch
14.00	Summing up & Closing Ceremony

* * * * * *

Indian Express

POLLUTION WATCH

Ambient air quality at B S Z Marg (ITO Intersection)

Eight hours average value

On Dec. 22, 1993 Parameter In µg / m3	Measured Value 6am to 2pm	Measured Value 2pm to 10pm	Acceptable Value
Sulphur dioxide (SO_2)	24	32	120
Oxide of Nitrogen (NO_2)	70	83	120
Carbon monoxide (CO)	2261	4637	5000
Suspended Particulate Matter (SPM)	571	575	500

µg / m3 = Unit micrograms per cubic metre of air
Data provided by Central Pollution Control Board

POLLUTION WATCH

Ambient air quality at B S Z Marg (ITO Intersection)

Eight hours average value

On Dec. 27, 1993 Parameter In µg / m3	Measured Value 6am to 2pm	Measured Value 2pm to 10pm	Acceptable Value
Sulphur dioxide (SO_2)	33	65	120
Oxide of Nitrogen (NO_2)	94	121	120
Carbon monoxide (CO)	3220	16345	5000
Suspended Particulate Matter (SPM)	630	1292	500

µg / m3 = Unit micrograms per cubic metre of air
Data provided by Central Pollution Control Board

POLLUTION WATCH

Ambient air quality at B S Z Marg (ITO Intersection)

Eight hours average value

On Dec. 30, 1993 Parameter In µg / m3	Measured Value 6am to 2pm	Measured Value 2pm to 10pm	Acceptable Value
Sulphur dioxide (SO_2)	37	42	120
Oxide of Nitrogen (NO_2)	106	88	120
Carbon monoxide (CO)	2791	3907	5000
Suspended Particulate Matter (SPM)	674	747	500

µg / m3 = Unit micrograms per cubic metre of air
Data provided by Central Pollution Control Board

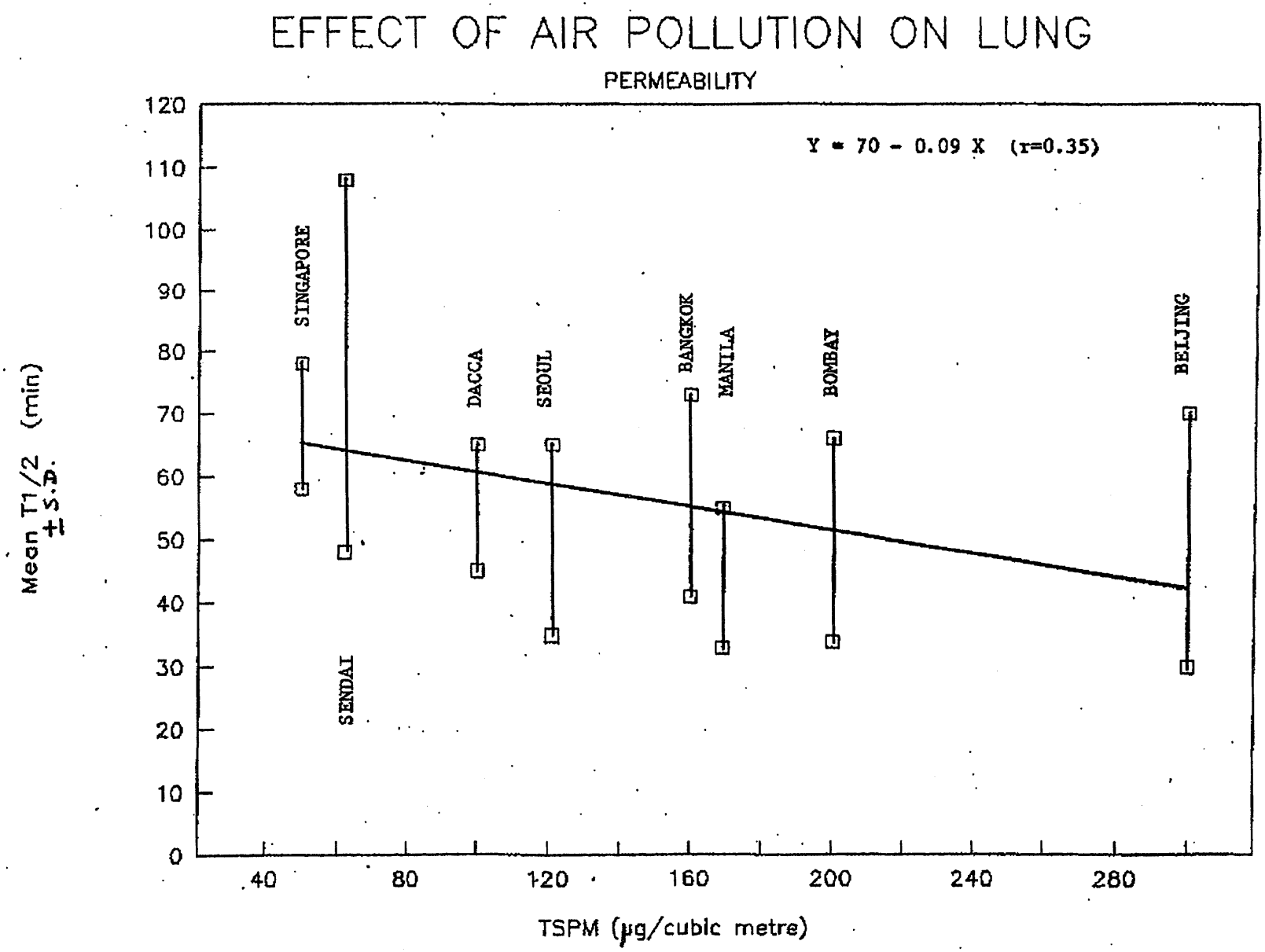

EFFECT OF AIR POLLUTION ON LUNG
PERMEABILITY
Y = 70 - 0.09 X (r=0.35)
Mean T1/2 (min) ± S.D.
TSPM (µg/cubic metre)
SINGAPORE
SENDAI
DACCA
SEOUL
BANGKOK
MANILA
BOMBAY
BEIJING
0
10
20
30
40
50
60
70
80
90
100
110
120
40
80
120
160
200
240
280

FIG 1

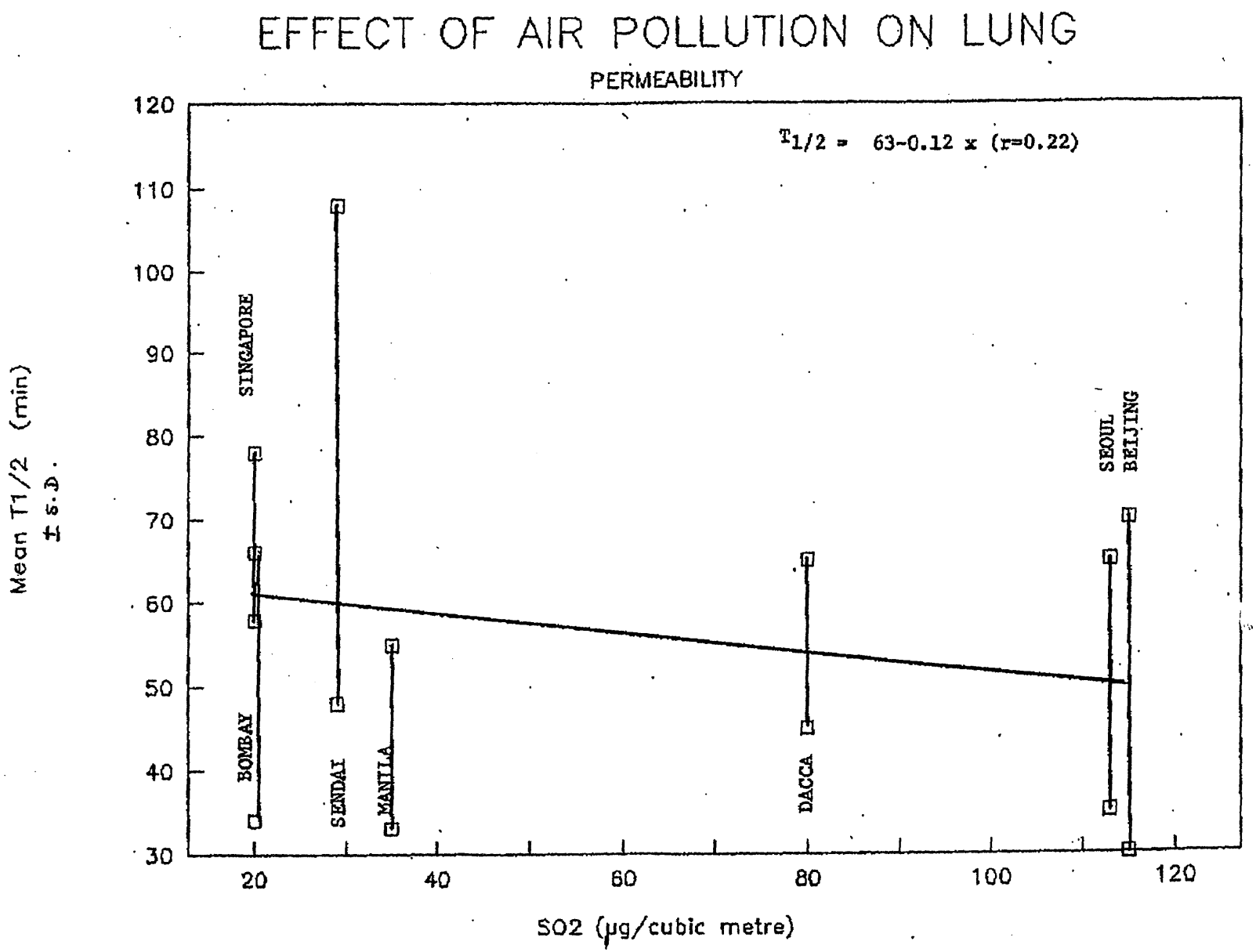

EFFECT OF AIR POLLUTION ON LUNG
PERMEABILITY
T1/2 = 63-0.12 x (r=0.22)
Mean T1/2 (min)
± S.D.
120
110
100
90
80
70
60
50
40
30
20
40
60
80
100
120
SO2 (μg/cubic metre)
SINGAPORE
BOMBAY
SENDAI
MANILA
DACCA
SEOUL
BEIJING

FIG. 2

EFFECT OF AIR POLLUTION ON LUNG

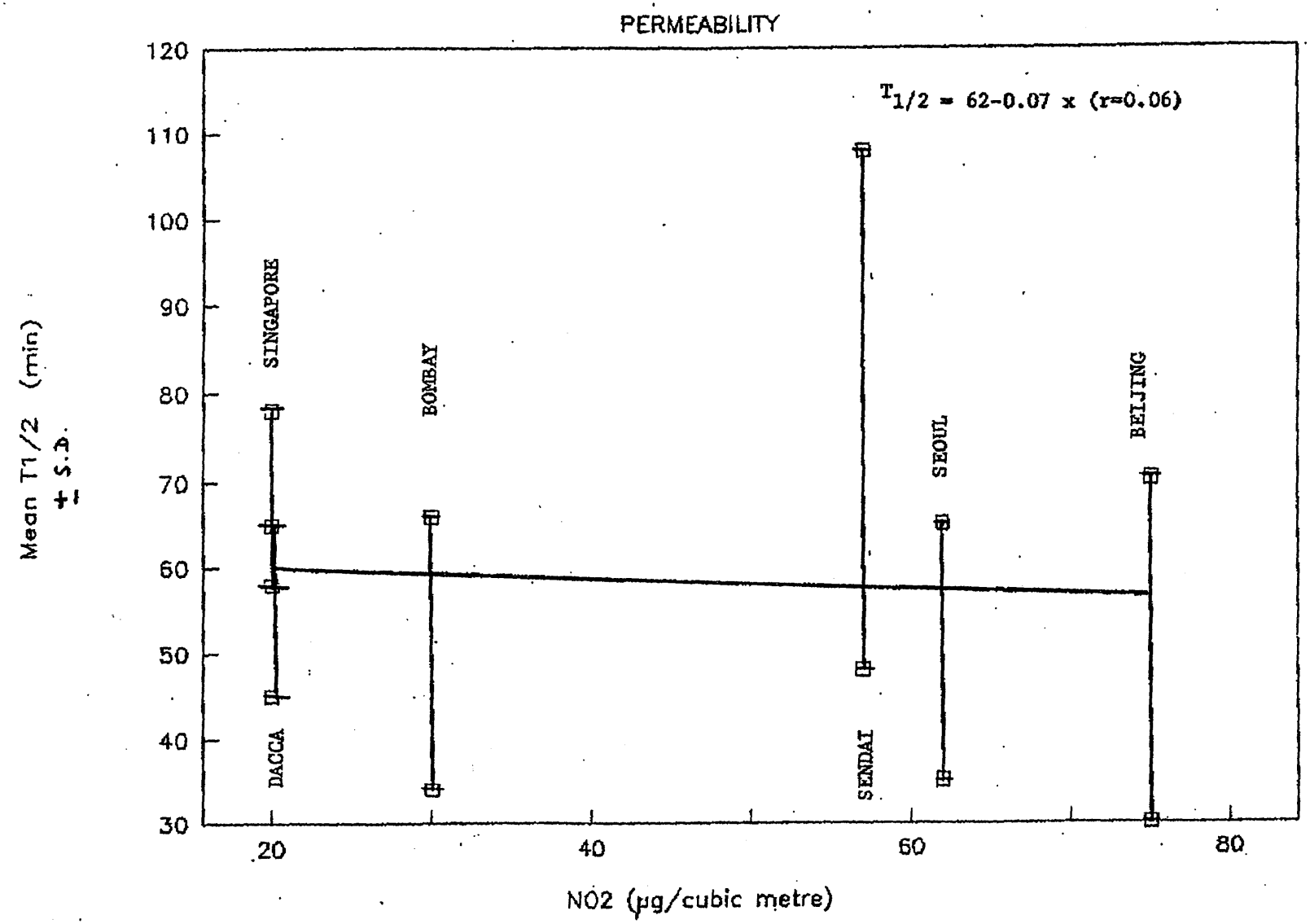


Fig. 3

No. 118, December 1993

BARC NEBULISER TECHNIQUE

An IAEA/BARC Regional Co-ordination Meeting on "Radioaerosol Inhalation Imaging for the Diagnosis of Respiratory Diseases in Developing Countries" was held during December 9 to 11,. 1993 at the Radiation Medicine Centre. This meeting consisted of participants from Korea, Phillipines, China, Thailand, Bangladesh, Malaysia, Singapore and India. The aim of the Meeting was to establish the role of environmental pollution on the lung epithelial integrity, or in other words, to study whether pollution effects the lung function. Estimation of lung epithelial integrity is done by calculating the half time clearance of ^{99m}Tc-DTPA aerosols deposited in the lungs during ventilation. These aerosols are deposited in the lung by using the BARC Nebuliser. Environmental pollution data was obtained from respective environmental pollution data testing agencies in the countries represented by the delegates. The preliminary analysis of data from diverse geographical regions showed that the BARC Nebuliser was by far the best method of obtaining a small aerosol particle of 0.8 μm size. A comparison with commercial Nebulisers had shown that this simple inexpensive device made by the Health Physics Division, BARC, was the most ideal. It was also observed that T/2 clearance of ^{99m}Tc-DTPA was related to the levels of environmental pollution, especially to the levels of SO_2 and suspended particulate matter.

Although the data was small, the trends were significant. This very exciting result has opened up several avenues of testing. It is possible to monitor a large number of subjects in order to establish the effects of environment on the lungs. This will be the first time a quantitative method of testing effect of environmental pollution on the human physiology is available. Since the lungs one the primary organs exposed directly to the environment, it is now, feasible to relate lung damage with incidence of resiratory disorders.

r. G. Nair
IAEA, 1400 Vienna
PO B No. 100

188v

Project Title and Number: FOOD IRRADIATION PUBLIC CONTROL AND ACCEPTANCE (RPFI-PHASE III), RAS/89/044

Project Description: The project aims at transferring the technology of food irradiation to industry through poper process control and evaluation of acceptance. The introduction of this technology will reduce the post-harvest storage loss and improve the hygienic quality of foods and increase export potential of participating countries. The activities of this project included (1) a Coordinated Research Programme, (2) Workshops, and (3) Expert Missions. This project will be closed on 31 December 1993.

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

Project Officer: M. Ahmed

Major Activities and Achievements in 1993:

1. The Evaluation Mission of this project visited some participating countries, viz. Bangladesh, China, Indonesia, Thailand and Viet Nam from 22 August to 18 September 1993 to assess the activities conducted under this project.

2. The final Research Coordination Meeting of the Coordinated Research Programme of this project was held in Taejon, Republic of Korea from 20 to 24 September 1993. Australia, Bangladesh, People's Republic of China, India, Indonesia, Japan, Republic of Korea, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam participated in this meeting.

3. A Regional Workshop on Harmonization of Regulations to Facilitate Trade in Irradiated Foods was held in Lucas Heights, NSW, Australia, from 6 to 17 December 1993.

P r o s p e c t u s

Title:	UNDP/IAEA/FAO REGIONAL (RCA) WORKSHOP ON HARMONIZATION OF REGULATIONS TO FACILITATE TRADE IN IRRADIATED FOODS
Place:	Australian Nuclear Science and Technology Organisation (ANSTO), Sydney, Australia
Date:	6 - 17 December 1993
Deadline for nominations:	31 August 1993
Organizers:	International Atomic Energy Agency, the United Nations Development Programme and the Food and Agriculture Organization of the United Nations in co-operation with the Government of Australia through the Australian Nuclear Science and Technology Organisation.
Language:	English
Participation:	The workshop is open to 13 participants from developing IAEA Member States participating in the UNDP Asian Regional (RCA) Project on Food Irradiation on Process Control and Acceptance, RAS/89/044
Purpose of the workshop:	The purpose of the workshop is to inform food control and related officials responsible for formulating regulations for food irradiation and its control procedures, on the preparation of a harmonized regulation based on the principle of the Codex General Standard for Irradiated Foods of the Code of Practices and relevant Recommendations of the International Consultative Group on Food Irradiation (ICGFI).
Participants' qualifications:	Candidates should be officials of a national food control authority and responsible for formulating regulations on food irradiation.
Nature of the workshop:	The trade in irradiated food is likely to increase as several developed and developing countries have accepted and applied irradiation as a method for food preservation and ensuring hygienic quality of food. The technology of food irradiation is being implemented for commercial purposes in the Asia and Pacific region as several countries have established and/or are establishing commercial/demonstration food irradiators. Most of the Member States in the region have food irradiation regulations that are largely unharmonized. Absence of harmonized regulations among the trading partners is a barrier in inter-regional and international trade. As the RCA region is one of the largest exporters of food and agricultural products, there is an urgent need for harmonization of regualtions to facilitate trade. This workshop will train food control related officials on harmonized regulations based on the Codex General Standards for Irradiated Foods and Codes of Practice and the relevant recommendations of the ICGFI. The participants will also be trained on how to update their existing food irradiation regulations based on the recommendations of the international organizations

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, the office of the United Nations Development Programme or the Ministry of Agriculture). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 August 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

Language certificate:

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

Administrative and financial arrangements:

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

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

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

1921

Project Title and Number:

CRP ON THE USE OF ISOTOPES IN STUDIES TO IMPROVE YIELD AND N_2 FIXATION OF GRAIN LEGUMES WITH THE AIM OF INCREASING FOOD PRODUCTION IN SAVING N-FERTILIZER IN THE TROPICS AND SUB-TROPICS IN ASIA (D1.-40.04)

Project Description:

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

Participating Member States:

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

Project Officer:

Seth K.A. Danso.

Major Activities/Achievements in 1993:

1. Fifth RCM in Tamworth, Australia, 29 August - 3 September 1993.
2. Workshop in Brisbane and Coluum, Australia, 7 - 16 September 1993.
3. Visits of consultant to India and Philippines.

Time Table of Planned Activities in 1994:

1. Consulants visit to Pakistan, Sri-Lanka, Thailand and Vietnam.
2. Final RCM in Hyderabad, India, 29 August - 3 September 1994.

1940

JOINT FAO/IAEA DIVISION
OF NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE

INTEROFFICE MEMORANDUM

TO: Mr. J. Easey
TCPM

DATE: 1994-01-24

THROUGH: Mr. W. Klassen
Act. DIR-RIFA

OUR REF.: 311-RAS/5/021

FROM: S.K.A. Danso
Soil Fertility, Irrigation
and Crop Production Section

YOUR REF.:

EXT.NO.: 1649

SUBJECT: **1993 - Annual Report, RAS/5/021**
CRP on "The Use of Isotopes to Improve Yield and Nitrogen Fixation of Grain Legumes"

The fourth Research Co-ordination Meeting of this UNDP-funded project was held in Tamworth, Australia, from 29 August to 3 September, 1993. Eighteen participants attended and presented reports on achievements made towards improving the abilities of grain legumes to use inexpensive atmospheric nitrogen gas to increase yields. Each participant presented data to show the big differences obtainable in nitrogen fixation and yield of various grain legumes screening within existing cultivars and varieties, and most interestingly the enhancement in these parameters resulting from induced mutation of existing cultivars. The ^{15}N methodology was shown to be an invaluable tool for distinguishing between cultivars for nitrogen fixation capacity. In many cases high benefits were derived from artificially introducing (inoculating) the nitrogen fixing bacterium (*Rhizobium*) into soil and without which fertilizer N was shown to be necessary for identical yields. For those cases where *Rhizobium* inoculation did not increase yields, it was found that the organisms occurred naturally in the soil. All the reports were discussed thoroughly, after which the following year's experiments were planned. Given the beneficial effect of legume growth on the fertility of soil, it was decided to quantify this benefit in terms of growing a cereal after a legume, in comparison to a cereal after cereal rotation. Following the RCM, participants were funded to attend two meetings of direct relevance to their research, in Brisbane and Coluum, Australia.

/2

The Brisbane meeting (7 - 10 September) was organized by the Biological Nitrogen Fixation Association of Australia. At this conference, many participants presented papers on results they have obtained through the UNDP-funded project, and besides, the meeting gave them the opportunity to discuss with some of the leading experts on biological nitrogen fixation, including some recent advances in the field. The papers are to be published in the international journal, Soil Biology and Biochemistry.

The symposium organized in Coluum was on acid soils. Soil acidity is a universal problem, but more so in developing countries where most farmers cannot afford the cost of liming to correct for this plant stress. The symposium was well attended, and attracted over 200 participants from 30 countries. Here again, some of our participants gave oral and poster presentations, which are going to be published in the famous journal, Plant and Soil. Of greatest interest to our programme were the many reports showing that the high organic matter turnover with legume growth decreases the harmful effects of soil acidity on subsequent crops, and that many genotypes of legumes are acid-tolerant and will grow under soil acidity levels that will not permit growth of many other plants.

cl: None

cc: W.Brennecke
RCS

SKADanso/ip-1647

Annex 18

New Project Proposals

- Presentation by Mr. B. Sigurbjoernsson "An Overview of Programmes of the Joint Division of Nuclear Techniques in Food and Agriculture relevant to Asia and Pacific"

- Presentation by Mr. C. Hera "Increasing Crop Yields in the Tropics and Sub-tropics through Agroforestry"

- Presentation by Mr. B. Ahloowalia "Induced Mutations and Related Biotechnologies for Improvement of Vegatively Propagated Crops"

- Presentation by Mr. J. Dargie "Establishment of a Regional Rinderpest Seromonitoring Network in Asia in Support of the South Asia Rinderpest Eradication Campaign (SAREC)"

- Presentation by Mr. D. Lindquist "The Environmental Advantages of Fruit Fly Control with the Sterile Insect Techniques"

- Presentation by Mr. R. Hance "Agricultural Countermeasures following a Nuclear or Radiation Accident"

- Presentation by Mr. P. Loaharanu "Public Information and Trade Developments in Irradiated Food in Asia and the Pacific"

Presentation to the General Conference Meeting of the RCA

Wednesday, 29 September 1993

It has been said that a person can live a long and healthy life without ever seeing a medical doctor or taking medicine. It has also been said that a person can live a long and healthy life without ever driving a motor car or watching television. But watch a person who has been without food for one week and you will find him neither healthy nor happy.

There is no question that food represents the main preoccupation of mankind. As you will see on the graph, the world population is rapidly growing by roughly 1,000 million additional persons per decade. When we had a strategic planning meeting in the Joint Division a year ago the challenge we discussed was how to feed an additional 3 billion people by the year 2020.

As you will see on the next table, most of the world's population lives in Asia, or 56,1 %, and that the agricultural population in Asia is over 70%. What is most alarming about the statistics in this table is that the estimated number of malnourished persons in Asia in 1988 was 400 million and that 80% of malnourished persons in the world live in Asia.

The next table shows the development of some nutrition statistics over the years 1965 to 1990. While it is evident that things are improving, one is nevertheless struck by the fact that in 1990 about 45% of all children in Asia are underweight. In absolute numbers, there are about 160 million children underweight in Asia.

It is obvious to me that any region in the world which has this alarming number of starving children cannot afford to ingore the food problem and neglect efforts to stimulate food production and equitable food distribution among its subjects. It was therefore a source of surprise and some embarrassment when it was discovered that after 1994 there would be no food and agricultural projects within the RCA programme.

The Agency in its joint programme with FAO had earlier extensive agricultural programmes in the Asian region. Some of the very first coordinated research programmes dealt with both fertilization and breeding of rice. Within RCA there were earlier several agricultural and food programmes. In the last very few years the number of projects, particularly technical cooperation projects, have sharply declined in the Asian region, and, as I said, food and agriculture threatens to disappear from the RCA programme after 1994.

It is tempting to assume that the reason for this is that there has been enough research done in food and agriculture, that there has been enough development in food and agriculture in Asia and that there is no need to continue work along these lines.

On the next graph you will see rice yields per hectare as they were in 1989. The data, drawn from an FAO report, show the enormous difference in yield which is obtained in the various countries of Asia and the Pacific. While in Australia the yield per hectare of rice is almost 8 tons, it is only about 2,500 kilos in the Philippines, India

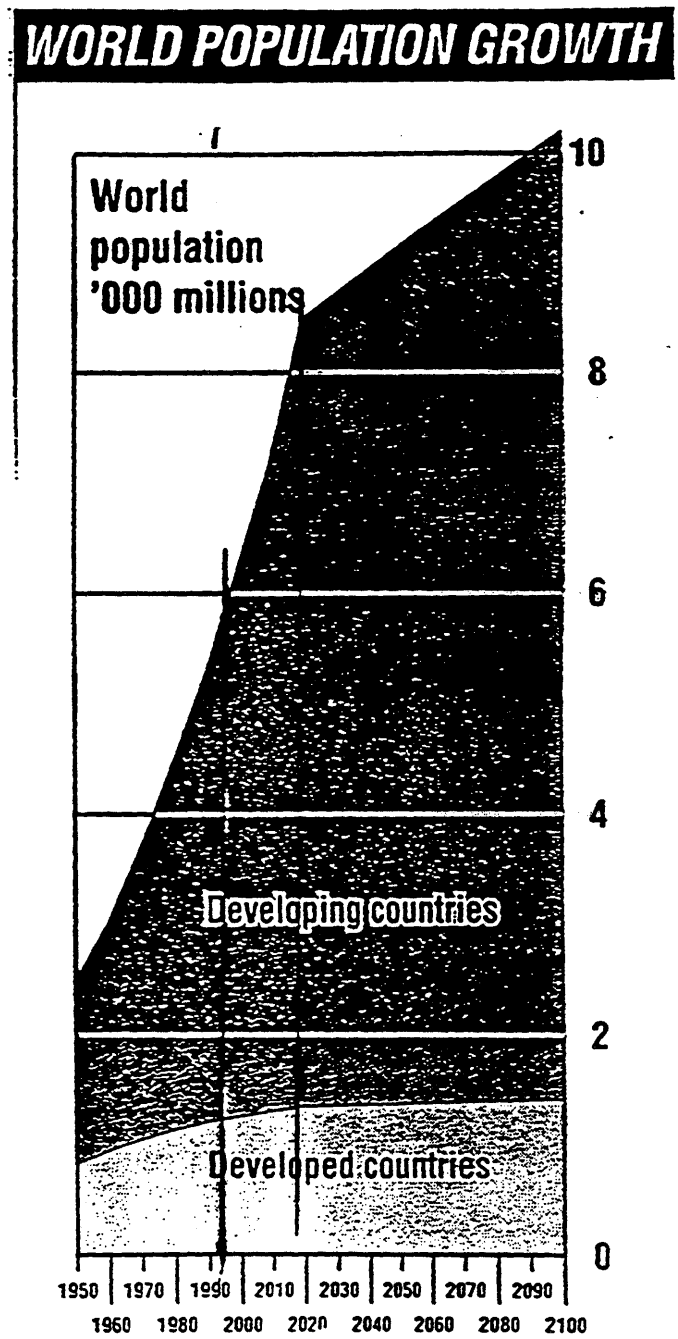
and Bangladesh, about 2,000 in Pakistan, less than 2,000 in Thailand and less than 1 ton in Kampuchea. In a recent report on some of the Agricultural Research Institutes of the Consultative Group of International Agricultural Research, there was a statement on the goals set for the International Rice Research Institute in the years to come. One of the main goals was to increase rice productivity which had not significantly increased since the release of the first rice variety by IRRI in 1966, the famous IR-8, the very symbol of the green revolution.

You will see from this graph alone that agricultural research in Asia has a long way to go. It is also interesting to see on the next table the enormous difference in the levels of mineral fertilizers applied to rice in Asia, ranging from 415 kilos in Japan to 0,3 kilos in Laos. Although we are not about to encourage every farmer in Asia to apply high amounts of mineral fertilizers, this indicates the difference in development in food production in the various Asian countries.

I hope these examples illustrate to you the enormous possibility for agricultural research and development in Asia and in this regard the Agency can help by assisting with the application of nuclear techniques in research and in development. We have a whole menu to select from in nuclear techniques as you see on the next chart.

Irradiation can be used to inhibit sprouting in potatoes and onions, it can sterilize insects for use in the sterile insect technique campaigns for control or eradication, it can induce mutations in crop plants leading to improved varieties, it can kill microbes in foodstuffs and thereby prolonging shelflife of perishable food items, it can eliminate dangerous foodborne pathogenes in such products as chicken and it can disinfest grain and thereby facilitate movement in international trade of a number of products including both grain and fruits and vegetables. Likewise, as seen in the next picture, isotopic tracers , both radioactive and stable, can be used in agricultural research for studying photosynthesis, nutrient uptake from soil, nutrition of animals, movement of nutrients throughout the animal body for the formation of meat and production of milk, for tracing pesticides and their residues in food and the environment. The use of isotopic tracers has become an essential feature in productive research in food and agriculture.

The next chart shows you the structure of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. As you see, the Division is a part of two UN organizations , the FAO and the IAEA. This ensures that the programmes and activities that the Division undertakes and supports is always within the line of priorities established by Ministries of Agriculture which form the Governing Bodies of FAO as well as the priorities established within the Atomic Energy side which represented by the Governing Bodies of the IAEA. The Joint Division has six subject matter Sections dealing with soils, plant breeding, animal production, agrochemicals, insect control and food preservation. Five of these Sections are supported and serviced by corresponding units in the Seibersdorf Laboratory. Research and project opportunities for RCA will now be presented by Heads of the six Sections of the Joint Division.


WORLD POPULATION GROWTH
World population '000 millions
10
8
6
4
2
0
Developing countries
Developed countries
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100

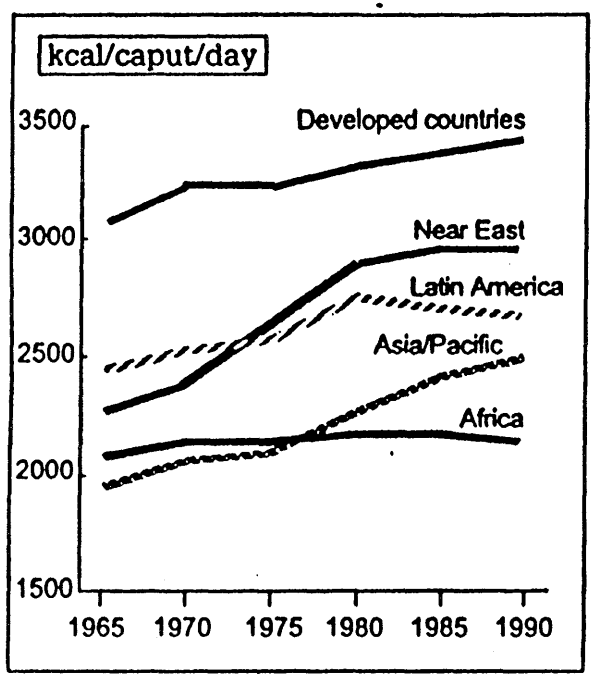
ASIAN STATISTICS (1988)

	Asia-Pacific	Rest of World	Asia-Pacific as % of World
Total population (m)	2,871	2,245	56.1
Agricultural population (m)	1,706	642	72.7
Agricultural land/agricultural pop.	0.26	1.60	41.3
Estimated no. of malnourished (m)	400	100	80.0

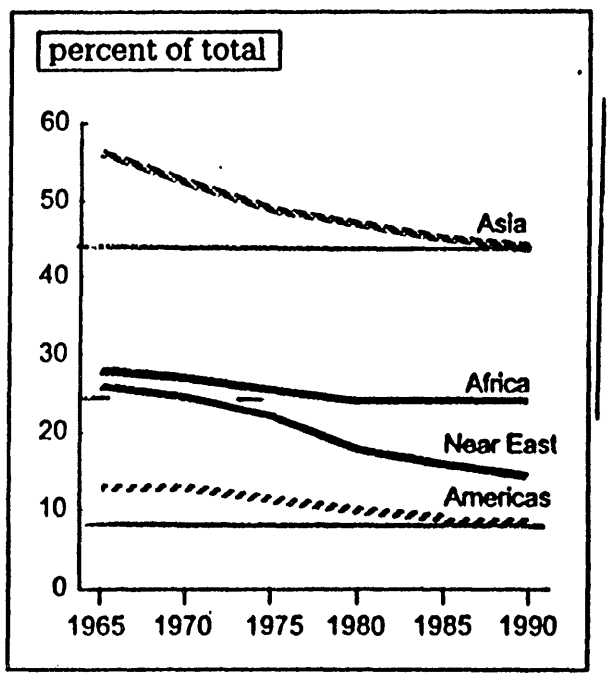
RD Special: Nutrition

10

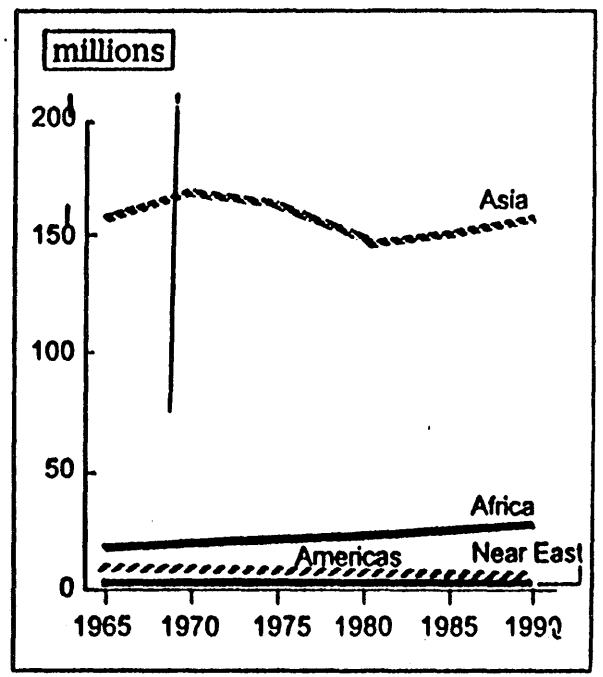
World dietary energy supply continues to increase...



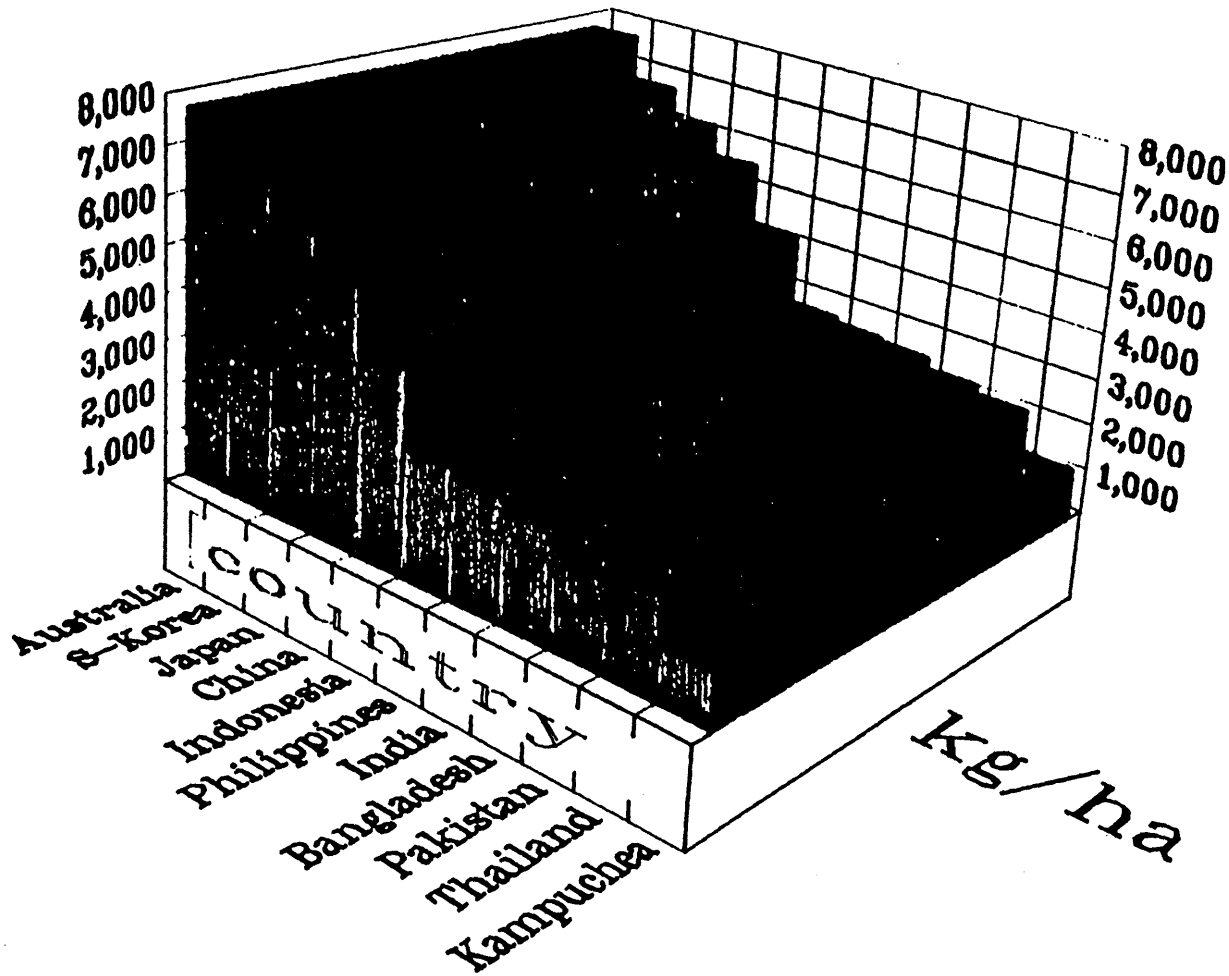
The incidence of underweight in children is falling...



...but numbers of underweight children remain high



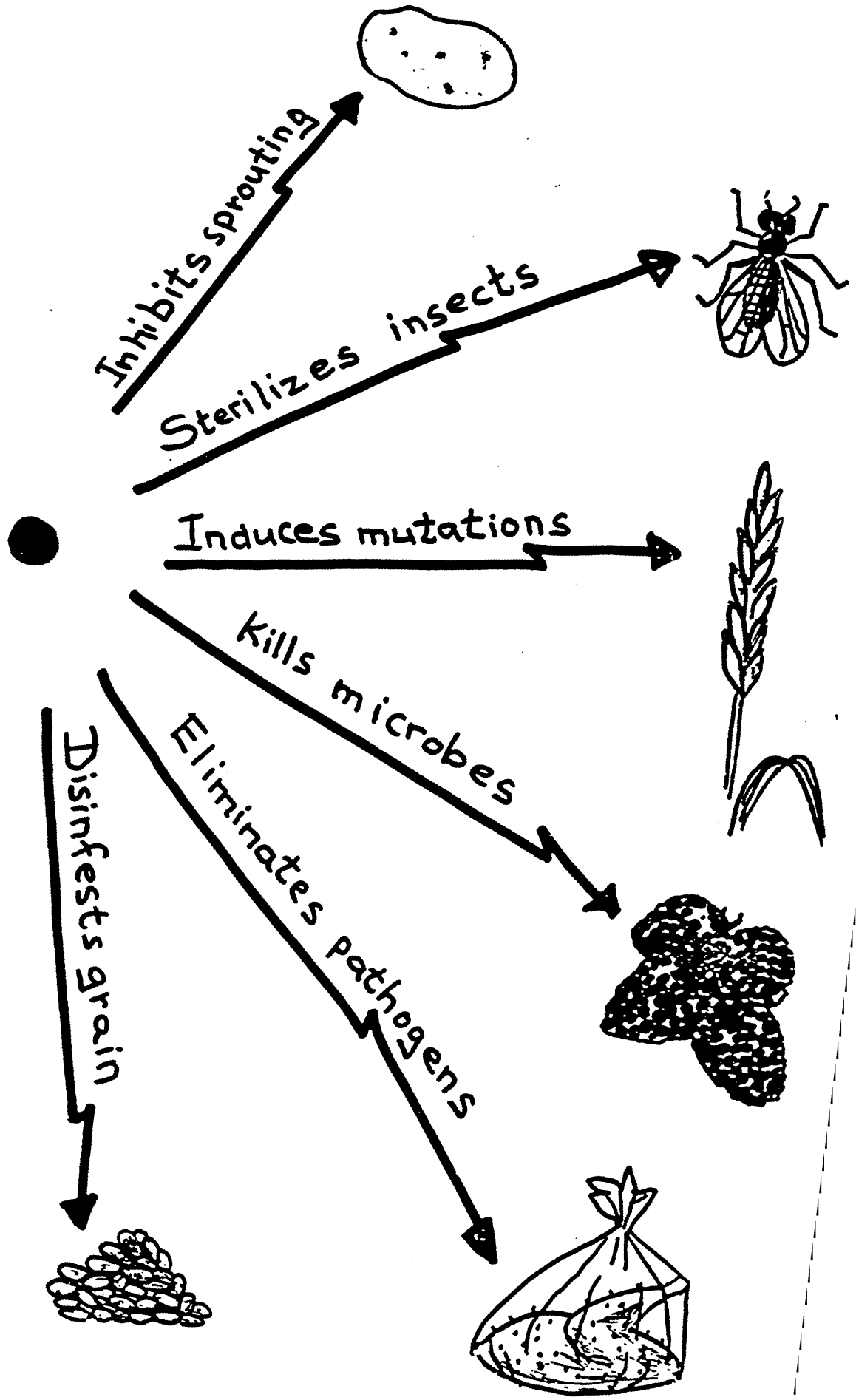
RICE YIELDS (1989)



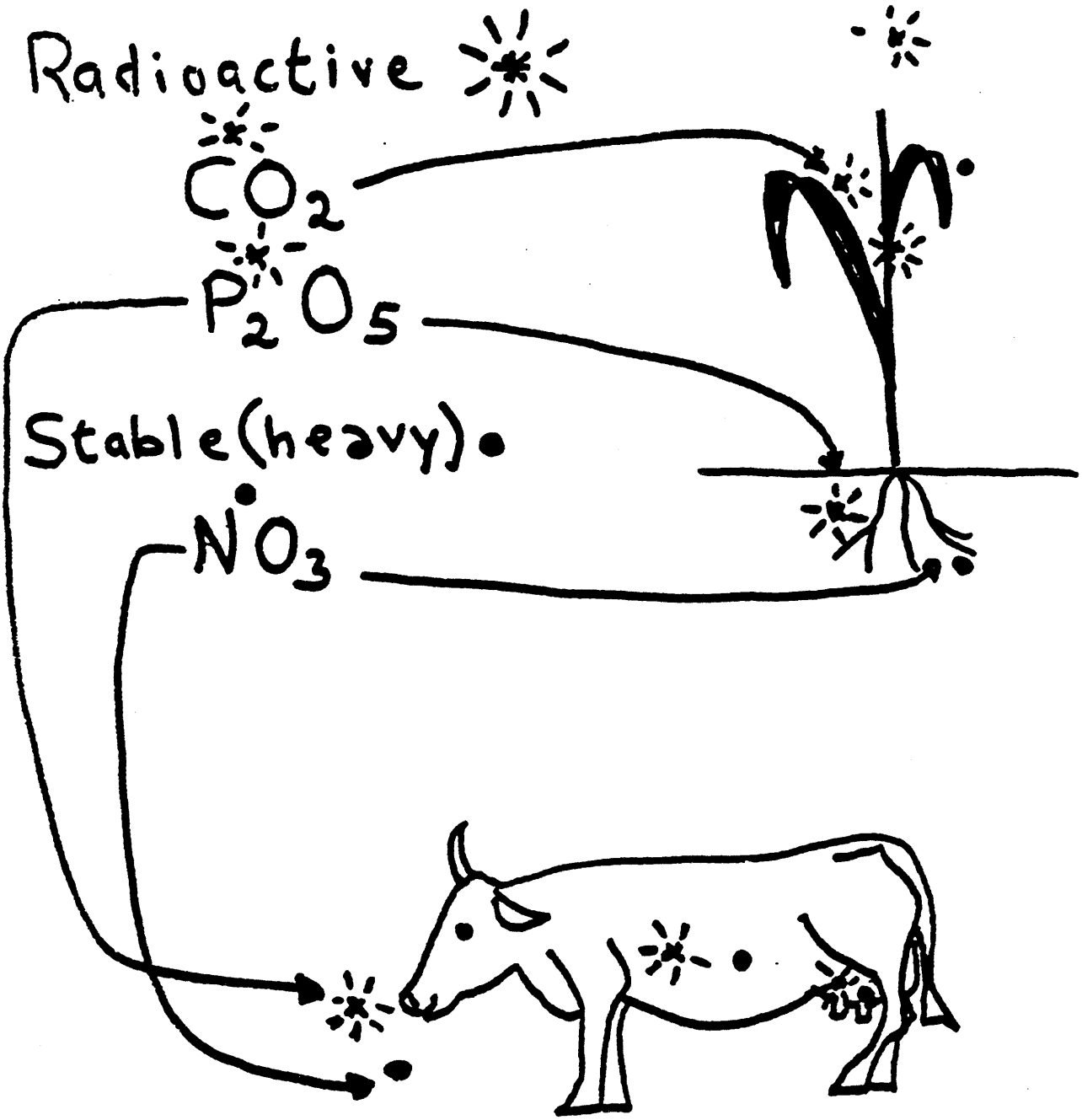
USE OF FERTILIZERS IN ASIA IN 1988

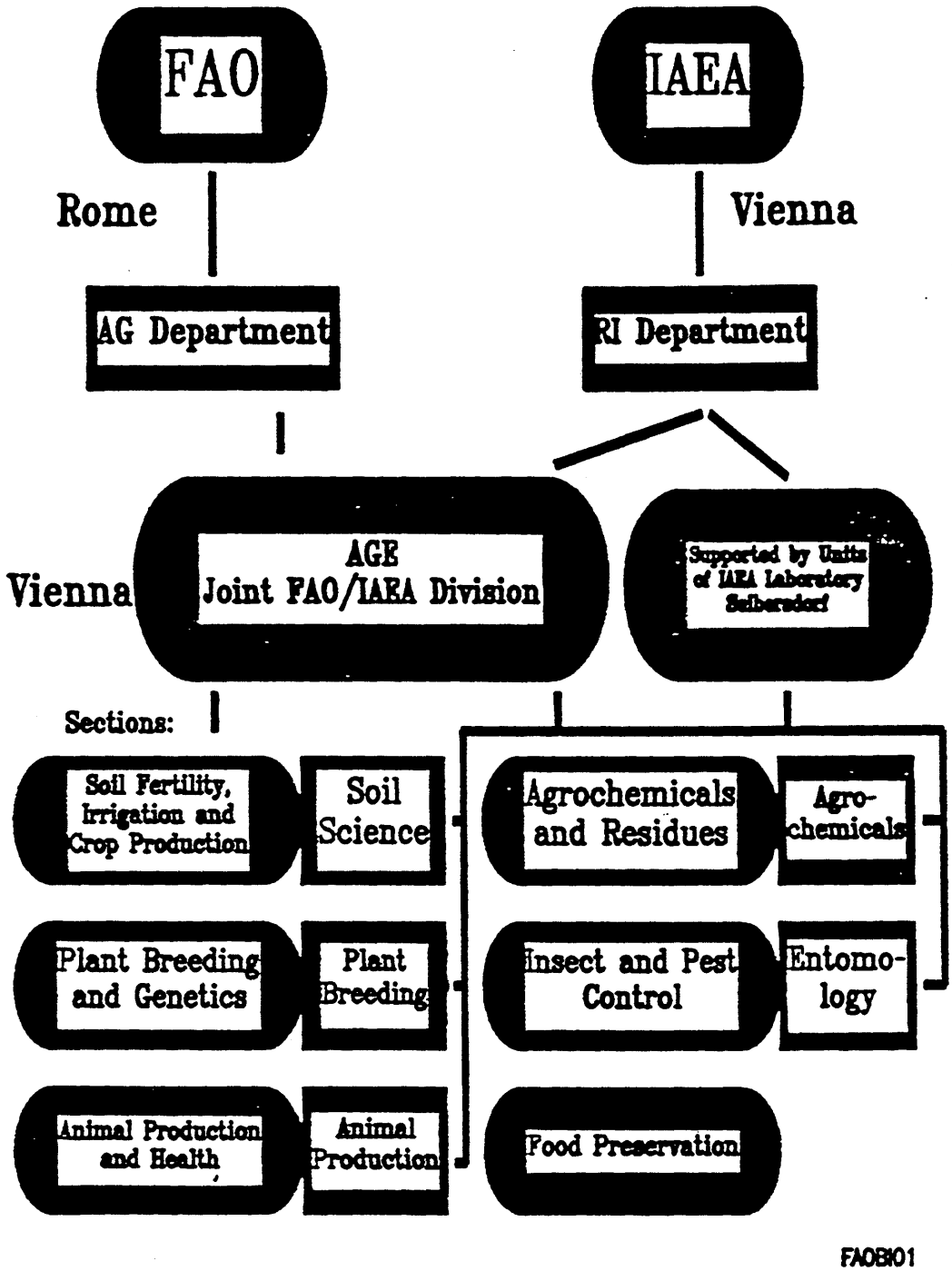
COUNTRY	KG/HA
JAPAN	415
REPUBLIC OF KOREA	400
D.P.R. KOREA	340
CHINA	262
INDONESIA	113
INDIA	65
PHILIPPINES	63
THAILAND	39
LAOS	0.3

IRRADIATION



ISOTOPIC TRACERS




FAO
IAEA
Rome
Vienna
AG Department
RI Department
Vienna
AGE
Joint FAO/IAEA Division
Supported by Units of IAEA Laboratory Seibersdorf
Sections:
Soil Fertility, Irrigation and Crop Production
Soil Science
Agrochemicals and Residues
Agro-chemicals
Plant Breeding and Genetics
Plant Breeding
Insect and Pest Control
Entomo-logy
Animal Production and Health
Animal Production
Food Preservation
FAOBI01

PROPOSAL FOR A

RCA

REGIONAL CO-OPERATIVE AGREEMENT FOR ASIA AND THE PACIFIC

PROJECT ON

INCREASING CROP YIELDS IN THE TROPICS AND SUB TROPICS OF ASIA AND THE PACIFIC THROUGH AGROFORESTRY

Soil Fertility Irrigation and Crop Production Section

JOINT FAO/IAEA DIVISION
OF NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE

September 1993

PROPOSAL FOR A RCA REGIONAL PROJECT

ON

INCREASING CROP YIELDS IN THE TROPICS AND SUB TROPICS OF ASIA AND THE PACIFIC THROUGH AGROFORESTRY

SUMMARY

1. Many Asian countries have major problems of:

a. rapidly declining soil fertility and crop production
b. soil erosion
c. large areas of saline and sodic soils
d. acute fuelwood shortages
e. desertification (in some cases)

2. The successful management of nitrogen-fixing trees in agroforestry systems will materially help to overcome these problems by:

a. maintaining soil fertility for associated crops by means of nitrogen fixed being transfered to associated crops by addition of prunings and by underground transfers from roots of N fixing trees.

b. by protecting soil against erosion

c. growing salt tolerant N fixing trees (and non-fixing trees) in saline and sodic soils where the level of salt is too high for crop production.

d. providing fuelwood in areas where it is badly needed.
e. helping the rehabilitation of damaged soils. The input of N and organic matter from trees is essential for this.

3. While the potential of such trees is widely recognized, achieving their full potential depends on developing an expertise in laboratory and field studies to exploit large demonstrated bacterial/plant genotype differences, and the effects of management such as cutting times and intensity, effects of small addition of nutrients such as phosphate, effects of mycorrhizal fungi and, factors affecting the transfer of fixed N to associated plants.

4. An Asian Regional Network, through the Regional Co-operative Agreement for Asia and the Pacific (RCA) is proposed, to focus on the management of agroforestry systems as an effective approach to sustained, low input agriculture, while providing fuelwood for agricultural communities. The estimated cost for 10 collaborative countries over 5 years is $ 1,204,000.

BACKGROUND

A good farmland must produce food, fodder and fuelwood for the farmer with least inputs and if not improving, at least maintaining the fertility of the soil. These outputs could be expected in agroforestry - a system which mixes traditional farming with tree growing. The integration of trees, especially nitrogen fixing trees into agroforestry systems can make a definite contribution to restoring and maintaining soil fertility thus sustaining crop production, combating erosion, in addition to providing fuelwood. Field trials carried out at the IITA (Ibadan, Nigeria) have shown that incorporation of *Leucaena* leaves into the soil can increase maize grain yield by about 60% when *Leucaena* is inoculated with an elite strain of Rhizobium. This is 30% more than the yield obtained by applying ammonium sulphate at the rate of 150 kg N/ha. There is also evidence that the decay of underground parts of nitrogen fixing trees especially after coppicing can make a substantial contribution to increasing the fertility of soil. In alley-cropping systems, rows of trees are grown alternating with rows of crops such as cereals and vegetables. The trees fix nitrogen and are periodically pruned - the foliage is used as manure for the crops thus giving them nutrients and building up organic matter which improves soil physical properties. Some of the foliage can also be used as fodder and the stems give the fuelwood.

The use of trees for rehabilitating and maintaining soils in agricultural systems is particularly attractive both for high rainfall and low rainfall areas. In semi-arid and arid areas, trees are often able to tap soil water not available to more shallow rooted plants. Their perennial nature with a wide spreading deep root system makes them especially good for holding soil against erosion - a major problem affecting soil fertility in upland areas and at the same time aggravating floods (almost an annual misery in Bangladesh) in low lying areas. Again, field experiments at IITA have shown that *Leucaena* and *Gliricidia* grown as alley-crops can decrease soil erosion by over 85% if grown at 4 m spacing and can virtually arrest erosion if grown at a 2 m spacing.

In Pakistan alone about 5.7 million ha of land on the Indus plain suffer from salinity and alkalinity. Agricultural production losses are estimated at US$ 140 million per year. Similar situations exist in India, Bangladesh, Sri Lanka, Thailand. Growing salt-tolerant trees has often been recommended to rehabilitate saline areas and to provide fuelwood from what otherwise would be wasteland, e.g., an ACIAR (Australia) funded research project in Pakistan is aimed at identifying Australian tree and shrub species that can be grown and established in such saline and sodic (alkaline) soils. Similarly, acid soils are a major problem for crop production in many Asian countries (e.g., Malaysia, Thailand, Indonesia, Viet Nam and Sri Lanka). An approach similar to that used for saline soils is planned to be used to improve crop production in acid soils.

In almost every tropical and sub-tropical country forests are being cleared at some 11 million hectares annually, as a result of large population growth and a need for more food production. This has led to greatly shortened rotations, a rapid loss in productivity and the need to bring even more forest land under cultivation with a subsequent loss of fuelwood supplies. World bank data indicates that by the year 2000, some 3 billion people will be living in areas where fuelwood is acutely scarce or has to be obtained from elsewhere. Bangladesh, China, India, Indonesia, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam are categorized as deficit countries even now, while Nepal is reported to be in acute scarcity.

Although typical desert land is comparatively less in Asia than in places such as Africa, many areas suffer from arid climatic conditions. These areas will eventually turn into deserts unless they are protected. In this regard some nitrogen fixing trees (e.g., *Acacia* and *Prosopis*) because of their inherent capacity to thrive in soils of arid and semi-arid regions will form ideal agents of anti-desertification.

IDENTIFICATION OF THE PROJECT

A group of world specialists on nitrogen fixing trees, tree nutrition, soil fertility and agroforestry addressed some of the problems in a meeting held recently at IAEA. It was revealed that despite world recognition of the potential of nitrogen fixing trees in agroforestry systems, there is a great lack of knowledge on the management of nitrogen fixing trees in such systems. Very few studies have been made identifying the potentially high N fixing tree species. They recommended that priority should be placed to focus attention on nitrogen fixing tree systems for use in agroforestry and soil conservation and to examine the effects of management practices on nitrogen fixation, benefits to associated crops and the change of soil fertility properties due to the trees. They also recommended that isotopes mainly ^{15}N, ^{32}P, ^{13}C and other radiation techniques could contribute significantly to the success of this research.

ROLE OF IAEA - *A MAJOR ONE*

A number of other agencies are involved in related projects, e.g., the ACIAR (Australian Centre For International Agricultural Research) has funded projects on trees for saline soils in some Asian countries (e.g., Pakistan), and a project on nitrogen fixation by Casuarina in the People's Republic of China. The BOSTID-USAID (Board on Science and Technology for International Development - United States Agency for International Development) has one (or possibly two) programmes on nitrogen fixation by trees in Asia.

The British Commonwealth Science Council is attempting to commence programmes on rehabilitation of soils by nitrogen fixing trees in 4 Asian/Pacific countries (India, Malaysia, Sri Lanka, Western Samoa). Agroforestry (using nitrogen fixing trees) is the major programme of ICRAF (International Council for Research in Agroforestry, Nairobi, Kenya) and also a major programme of ICRISAT (The International Centre for Research in the Semi-Arid Tropics, Hyderabad, India). We have had expressions of interest in a trees programme from the People's Republic of China, Malaysia, India, the Philippines, Pakistan, Sri Lanka, Thailand and Vietnam. We are aware of acute interest also in the Philippines and

Indonesia.

There is a great interest in agroforestry activities in Asia and the Pacific Region. However, at present, the activities carried out by other organizations are rather limited. The IAEA could therefore make a major impact by: (i) adding the considerable power of ^{15}N and other isotope techniques to existing programmes, (ii) acting as a catalytic factor in bringing together existing workers in this important field and, (iii) in stimulating this research in other Asian countries. It's role in a network would be not only to transfer important technologies to Member States but also to bring together and act as a forum (via a network) for the limited resources and data available in the developing world in this activity.

Recent related activities initiated by the Joint FAO/IAEA Division includes two Co-ordinated Reserach Programmes, one on "The use of nuclear techniques in the management of nitrogen fixing trees for enhancing soil fertility and soil conservation" and the other on " The use of isotope studies on increasing and stabilizing plant productivity in low phosphate and semi-arid and sub-humid soils of the tropics and sub-tropics. In addition the Seibersdorf Laboratory plays an important role in back-up research. Studies so far in Seibersdorf have demonstrated large genotypic differences within tree species in nitrogen fixed, that cutting intensity can affect transfer of N to associated crops and that small P additions can have large effects on nitrogen fixation.

DURATION: 5 years

NUMBER OF PARTICIPATING COUNTRIES: 8 - 10 Countries

TOTAL BUDGET: $ 1,204,000

IAEA INPUTS REQUIRED

Year	Experts mm	Equipment $	Fellowships mm	Group meetings $	Total $
1995	5	200,000	12	30,000	316,000
1996	5	150,000	12	30,000	266,000
1997	3	150,000	12	30,000	246,000
1998	5	150,000	12	30,000	266,000
1999	3	50,000	-	30,000	110,000
Total	21 ($210,000)	700,000	48 ($144,000)	150,000	**1,204,000**

WORK PLAN

YEAR	1995	1996	1997	1998	1999
PHASE	**PHASE I**			**PHASE II**	
ACTIVITY	**RESEARCH ACTIVITIES**			**1. RESEARCH ACTIVITIES TO CONTINUE 2 INITIATION OF EXTENSION SERVICES AND FARMERS FIELD TRIALS**	

OUTPUTS EXPECTED

1. The ability to establish agroforestry (alley-cropping) systems suitable to the country for increased crop, fuelwood and fodder production, and maximize their benefit to agriculture.

2. Government-sponsored projects to use N fixing tree species to prevent or minimize erosion and arrest desertification.

3. Greater interaction and self-reliance at regional level on research for increasing crop, fuelwood and fodder production, prevention of erosion and desertification.

TARGET BENEFICIARIES

Initially, research institutes and universities (at the research stage - Phase I) and subsequently, the rural farming communities through agricultural extension networks (Phase II - a model project stage).

Responsible Officers:

Christian HERA
Head, Soil Fertility Irrigation and Crop Production Section
Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

and

Saliya KUMARASINGHE
Technical Officer responsible for Asia and the Pacific Region Projects
Soil Fertility Irrigation and Crop Production Section
Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

Meeting on Regional Co-operative Agreement For Research Development and Training related to Nuclear Science and Technology for Asia and the Pacific Region (RCA), September 29, 1993, Vienna International Center, Vienna, Austria

Induced mutations and related biotechnologies for improvement of vegetatively propagated crops

B.S. Ahloowalia
Plant Breeding and Genetics Section, Joint FAO/IAEA Division,
International Atomic Energy Agency, P.O.Box 100, Vienna, Austria

After cereals, crops such as banana, plantain, cassava, potato, sweet potato and sugarcane are the major source of calorie-intake in many Asian and Pacific countries. Indeed, among the low income groups, these crops are the only source of food security against starvation.

The vegetatively propagated crops are multiplied from tubers, bulbs and stems cuttings. Many of these plants do not produce seed. And when they do, the progeny does not resemble the parent. Hence, the conventional methods of breeding and selection can be supplemented with mutation induction to upgrade the well adapted local cultivars by changing specific characters such as tolerance to diseases and stress, e.g. soil salinity, drought.

It is now possible to multiply plants in tissue culture through a process called micropropagation. In this technique, small pieces taken from a plant are cultured under completely germ-free conditions on a nutrient medium. The medium is made from simple chemicals such as salts, vitamins, sugar to which a gelling agent such as agar is added to provide a solid base. The cultured pieces, tissues and cells are kept under controlled conditions of light, temperature, humidity and day-length which simulate the best summer-like conditions. As a result of the cultural conditions, the plants can be multiplied rapidly, in a small space, short duration and disease-free situation, and produce clones - exact copies of the original plant.

To give you an idea, in potato, a 10 mm long stem cutting can produce a complete plant with roots and a shoot with three leaves within one week of culture. This plant when cultured again can give rise to 3 plants in one week. If a plant doubles once a week, then repeating the process 20 times can produce 1.06 million plants in 21 weeks.

It is also possible to produce complete plants from single plant cells through a different but related process known as regeneration. In this process, cells are cultured on several complex media and in a step-wise manner. In many crops, plants can be regenerated from cells by producing somatic embryos. These embryos are similar to those formed in seeds, except they originate from vegetative rather then reproductive cells. During this process, the cells often grow first into a lump of cells - a callus, which on further culture produces complete plants. Often, some of the plants produced from callus differ from the donor plants from which cells were taken - a phenomenon called somaclonal variation.

These simple technologies of cell and tissue culture have wide implications in the production of new and improved cultivars of vegetatively propagated plants, and their rapid multiplication and distribution as disease-free propagules to the growers and farmers.

A plant cell carries all the genetic blue-print in it. The plant cells of which several thousand can be grown in a single Petri dish, can be irradiated to induce mutations to change their genetic make-up. In a manner, each cell taken from a vegetatively propagated plant is like a seed which after irradiation is capable of giving rise to a new type.

It is now possible to rapidly multiply the irradiated cells, tissues, and plants through tissue culture, and then select the desired plants either by growing them in the field or sometimes by changing the growing conditions while still in culture. For example, by adding salt or subjecting cells to desiccation, it is possible to select cells and plants resistant to salinity or drought.

In the Coordinated Research Programs and Technical Cooperation Projects for the improvement of vegetatively propagated plants, we have adopted the strategy of combining tissue culture with irradiation as a means to rapidly modify, select and multiply new and improved varieties of such crops. We are proposing the use of mutation induction in combination with plant tissue culture to breed high yielding, improved quality, disease resistant and stress tolerant cultivars of basic food crops in Asia and Pacific region. Starch producing plants such as potato, banana and plantain are the prime model crops amenable to improvement through this technology. We hope that the improved cultivars of these crops along with those of cassava, sweet potato, and sugarcane shall contribute to the increased food production in this region in the same way as has been achieved with wheat and rice.

Scientists around the world are attempting to identify, isolate and clone important genes which determine yield, quality and disease resistance. The long term goal and dream of the recombinant DNA technology is to be able to delete and insert specific genes in crop plants. On the other hand, the technologies of mutation breeding and tissue culture are already well advanced, and can pay handsome dividends in a short time and at a much low cost. In addition, induced mutations in the vegetatively propagated crops shall provide the basis of gene identification, isolation and insertion.

TITLE

Establishment of an inter-regional rinderpest sero-monitoring network in support of the Global Rinderpest Eradication Programme.

OBJECTIVES

To establish and quality assure an ELISA-based capability in national veterinary laboratories to serologically monitor rinderpest as part of the programme of global eradication of this disease and its causative virus.

BACKGROUND

Rinderpest (cattle plague) is the world's most devastating cattle disease. Although never occurring in the Americas and Australasia and eliminated from Europe at the beginning of the century, it still continues to cause enormous economic losses to livestock producers in Africa, Arabia and Asia. These losses are attributable not just to the animals that die, but to the cost of annual vaccination programmes, preventive measures and lost export markets in countres free of rinderpest. In the past five years in Africa, national vaccination programme alone have cost over $ 200 million.

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

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

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

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

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

NATIONAL INPUTS

Countries participating, whether in PARC, SAREC or WAREC will have a requirement to provide suitable laboratories facilities to carry out serological and disease surveillance. This will require not only the provision of suitable laboratory buildings and the infrastructure for them to operate effectively, but the necessary trained man-power and transport to ensure the collection and testing of samples. In the case of PARC, in nearly all participating countries EEC-funded national projects have ensured sufficient resources to provide for the field collection of sera and much of the required laboratory equipment.

AGENCY INPUTS

The role of the Agency will primarily be one of technology transfer and coordination, linked with an external quality assurance programme to ensure the validity of the results being obtained.

For many participating countries, and for all in Africa, previous and current IAEA technical cooperation projects and previous FAO/IAEA research coordination programmes will have already introduced an ELISA capability, through the provision of suitable equipment, training and technical backstopping. However, central to the inputs for this inter-regional programme is the provision of a validated and standardised rinderpest ELISA kit to national laboratories, technical backstopping to ensure its correct usage and the operation of an external quality assurance programme to assure both national and international bodies that the eradication programme is achieving its objectives.

LONG-TERM IMPACT

The successful global eradication of rinderpest will have enormous benefits to livestock producers in the world's poorest countries - since these are the very countries which still have rinderpest today! These benefits are not mearly ones of reduced direct losses through the disease and control measures, but include indirect ones of increased export markets and improved veterinary services created during the programme of eradication.

Vital to eradication is sero-surveillance, without which it is extremely unlikely that success could be achieved. Thus in real terms the impact of this inter-regional programme will be to ensure that the largest and most costly animal disease control programme can be seen to have succeeded.

COSTS

Year	Experts		Equipment	Training	Total
	Months	CC $	CC $	CC $	CC $
1	12	124,000	120,000	60,000	304,000
2	12	129,000	60,000	-	189,000
3	12	134,000	40,000	60,000	334,000
4	12	139,000	40,000	-	179,000
5	12	144,000	40,000	-	184,000

Grand Total: US$ 1,190,000

TABLE I: THE IMPACT OF RINDERPEST IN ASIA

Country	IAEA Member State	Rinderpest	Cattle numbers (millions)	Vaccinat. carried out	Cost of Vaccination (US$ x 10^3)	*)Overall losses from rinderpest
India	yes	yes	198	yes	792	2.2 bil.
Pakistan	yes	yes	17.7	yes	70.8	560 mil.
Afghanistan	yes	yes	1.6	yes	6.4	120 mil.
Bangladesh	yes	yes	23	yes	92	100 mil.
Nepal	no	?	63	yes	25.2	50 mil.
Butan	no	yes	0.4	yes	1.6	10 mil.
China	yes	?	81.4	?	?	?
Myanmar	yes	no	9.3	no	-	10 mil.
Thailand	yes	no (border)	6.0	yes	?	10 mil.
Indonesia	yes	no	10.3	no	-	?
Philippines	yes	no	1.6	no	-	?
Mongolia	yes	yes	11.2	yes	11.2	150 mil.
Sri Lanka	yes	yes	1.8	yes	8.0	10 mil.
South Korea	yes	no	2.1	no	-	?
Vietnam	yes	?	3.3	?	?	?
Totals	**yes**		**366**		**998**	**3.2 US$ (Billion)**

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

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PRESENTATION AT RCA MEETING, 29 SEPTEMBER 1993

Fruit Flies in Asia: The Environmental Advantages of Fruit Fly Control with the Sterile Insect Technique

Fruit flies cause enormous losses in Asia. Nearly all fruits and many vegetables require insecticide sprays in order to harvest eatable produce. The environmental impact of these insecticide sprays is becoming more pronounced and more recognized by Government officials and by environmental activists.

The Philippine Government has decided to develop mango production on Guimaras Island as a high priority agricultural development programme. Guimaras Island regularly produces outstanding quality mangos, however, fruit flies take a heavy toll of the fruit. Fruit fly control is mandatory if saleable mangos are to be produced. Fruit fly control is either by repeated insecticide sprays or by putting a paper bag around each mango. Both of these technologies are expensive, totalling from 25 - 40% of total mango production.

There are about 500,000 mango trees on the island; a total of 1 - 2 tons of insecticide are used annually for fruit fly control on these mango trees. There are of course many other fruits produced on the island, all of which require protection from fruit flies.

The SIT has been proposed as a solution the fruit fly problem on Guimaras.

The Australian Government has utilized the Sterile Insect Technique (SIT) for control of the Mediterranean fruit fly and the Queensland fruit fly. Also, the Australian Government is developing the Sterile Insect Technique for use against the Old World screwworm; this programme will be located in Malaysia.

The Japanese (Okinawa) Government has just completed a $ 100 million project to eradicate the melon fruit fly and the oriental fruit fly from their country. The Sterile Insect Technique was extensively used in this programme. The fruit fly factory in Okinawa can produce several hundred million sterile fruit flies a week.

The Sterile Insect Technique requires no insecticide and is environmentally friendly. As has been demonstrated in Australia and Japan, it is a very effective method of fruit fly control or eradication.

Thus, Asia has a factory for fruit fly production in Okinawa, considerable experience in fruit fly SIT programmes in Australia and Japan, and a serious fruit fly problem. In addition, the IAEA has TC projects for fruit fly control in Pakistan, Thailand and the Philippines.

All of the pieces for an effective regional programme are present in Asia. What is needed is a regional approach, a regional organization and some enthusiastic leadership. A Co-ordinated Research Programme, consisting of about 15 contracts and/or agreements, with annual meetings, will provide the spark to initiate fruit fly SIT activity in Asia. This programme will cost about $ 200,000 per year and should continue for 5 years.

D.A. Lindquist
Head, Insect and Pest Control Section
Joint FAO/IAEA Division of Nuclear
Techniques in Food and Agriculture

Suggestion for RCA Project

Agricultural countermeasures following a nuclear or radiation accident

There are currently 72 operational nuclear power plants in Asia with a further 18 under construction (Table 1). Examination of maps of prevailing winds shows that there are occasions when countries where there are no nuclear power plants could be subject to radioactive fallout from a nuclear accident elsewhere. Also, a release of radioactivity from some other source could have limited effects on agriculture as was shown in the Goiania incident in Brazil in 1985. Therefore, contingency plans are necessary, so that, in the event of an accidental release of radiation, steps can be taken to reduce the contamination of agricultural produce.

Immediately following a nuclear accident, short-term measures may be imposed to reduce exposure to ^{131}I which has a half-life of only 8 days. Basically consumption of potentially contaminated food is restricted until radioactive decay has reduced the radiation to an insignificant level, an action which is applicable almost everywhere. However, contamination of the agricultural environment with longer lived radionuclides, which will principally be ^{137}Cs and ^{90}Sr, requires more extensive measures to restore agricultural land to some sort of production.

There is a variety of techniques available, described as "agricultural countermeasures", with which to avoid or reduce radioactive contamination of agricultural products. However, almost all of them have been developed in temperate climates, many in response to the Chernobyl accident in 1986. There is little evidence to show which may be effective in tropical and sub-tropical conditions.

One option is to change the use of land by growing crops or varieties that accumulate lower levels of radionuclides than the crop normally grown in the area. This requires basic information about the uptake of radionuclides by different crops which is lacking for most tropical and sub-tropical crops. This particular issue is being partly addressed by a CRP run jointly by RIFA and NENS but only 7 participants are in Asia.

Other major options are to use various soil treatments to reduce the uptake by plants of Cs and Sr. The use of mineral fertilizers (K & P) at rates normally used in intensive agriculture has proved to be effective in reducing Cs and Sr uptake respectively in soils in the CIS of low fertility. The addition of lime to soils of low pH and of organic materials has also been useful. The circumstances under which these measures would be effective in tropical soils are not known.

The proposal, therefore, is to organize a coordinated programme of pot and small-scale field trials to establish the effectiveness of soil treatments in reducing Cs and Sr uptake by the major crops in typical soils of the region. Results must be obtained for at least 2 years for each combination of soil and crop.

It is anticipated that the costs would be similar to those of a Co-ordinated Research Programme, that is about US $5,000 per year for each participant plus the costs of a meeting to plan the work and another to prepare a final report.

1993-10-13/RJHance:ts (RCA)

Table 1 - Nuclear Power Plants in Asia

	Operational	Being built
China	2	1
India	9	5
Japan	44	9
Kazakhstan	1	
Korea, Republic of	9	3
Pakistan	1	
Taiwan	6	

Title: PUBLIC ACCEPTANCE OF AND TRADE DEVELOPMENTS IN IRRADIATED FOOD IN ASIA AND THE PACIFIC

Background: The Asian Regional Co-operative Project on Food Irradiation - RPFI (Phases I, II, III), in operation under the RCA since 1980, has demonstrated the effectiveness of irradiation as a technology for reducing food losses and food-borne diseases and facilitating food trade. The technology has been successfully transferred to local industries in several Asian countries including Bangladesh, China, India, Indonesia, Republic of Korea, Pakistan, the Philippines, Thailand and Vietnam. All of these countries have promulgated regulations to control the application of this technology as well as built demonstration/commercial irradiators to introduce irradiated food into the market. Market testings and commercial sale irradiation foods in several countries in the region have been successfully carried out. A model regulation has been prepared by the senior food control officials who attended the Workshop on Harmonization of Food Irradiation Regulations in Australia, 7 to 16 December 1993. Acceptance of this regulation by the RCA countries will facilitate trade in irradiated foods in the region of Asia and the Pacific.

The achievements of RPFI complement the IAEA General Conference Resolution 588 on "Practical Utilization of Food Irradiation in Developing Countries", unanimously adopted in September 1992 and the approval of the IAEA Board of Governors at its June 1993 Session of the detailed project proposal requested by the Resolution 588.

Thus, the objectives of the three phases of RPFI have been met. There is a need to further co-ordinate activities of food irradiation in the region to ensure wide acceptance by the public and free circulation of irradiated food in RCA countries. The next phase of RPFI (5 years), therefore, should be supported by TC as a "model project" according to the following plan.

1. Public Information Seminars

A number of national seminars will be organized at the time countries in RCA are introducing irradiated food into the market on a commercial scale. The seminars will serve the purpose of not only informing the local public of the safety and benefits of irradiated food but also neutralizing and counteracting any negative views from activists/opposition groups of the technology. It could facilitate removal of perceived consumer resistance and build up confidence on food irradiation as a benefit to health and economy. A total of nine such seminars of 3 days duration each are envisaged.

2. Expert Services

Expert assistance on marketing of irradiated food should be provided just prior to and during the sale of irradiated food (1m/m per country)

3. *Free Exchange of Irradiated Foods*

Subject to local regulations, irradiated food produced in one RCA country should be allowed to enter and be put on sale in another RCA country without any restriction. Such a free exchange would provide a strong incentive to international trade in irradiated food in the region and possibly worldwide.

4. *Regional Seminar*

The experience on public acceptance, market testings and commercial sale of irradiated food, import/export of such food, etc. should be evaluated at a regional seminar to be attended by key policy makers from the region, i.e. representing governments, food industry and trade, consumer organizations, the massmedia. Such a seminar should be organized at the end of the tenure of this project.

5. *Participating Countries*

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

6. *Budget*

National Seminars on Public Information (a total of 9)	US$ 90,000
Regional Seminar	US$ 45,000
Coordinators Meetings (a total of 3)	US$ 75,000
Expert assistance (1m/m per country)	US$110,000
Miscellaneous	US$ 20,000
TOTAL:	US$340,000

RCA ANNUAL REPORT - 1993

Project:

Research Reactor Utilisation, RAS/4/011

Project Officer:

K. M. Akhtar.

Participating Member States:

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

Project Description:

The aims of the project are to promote utilisation of research reactors operation of the facilities; assist in uninterrupted availability of irradiation services and irradiation of targets for production of radioisotopes. The project comprises training courses, workshops and coordinated research programmes. Phase 1 of the project will complete in 1994 and a programme for the Phase 2 has been defined in the Project Formulation Meeting held in Seoul in October 1993. A complete description of Phase 2 programme is provided in the meeting report which is available on request.

Major Activities in 1993:

1. Training course on 'Calculation and Measurement of Neutron Flux and Spectrum in Research Reactors', 27 September - 15 October 1993, held at Serpong, Indonesia. It was attended by 13 participants from 8 RCA countries.
2. Project Formulation Meeting, Seoul, 22 - 26 October 1993.

Activities Planned for 1994:

1. Regional workshop on 'Research Reactor Utilisation', 26 April - 13 May 1994, at ANSTO, Sydney, Australia.

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PROJECT FORMULATION MEETING ON RCA PROJECT RESEARCH REACTOR UTILIZATION RAS/4/011

TAEJON, REPUBLIC OF KOREA 18 TO 22 OCTOBER 1993

I. OPENING SESSION

This Project Formulation Meeting (PFM) was held at the KAERI Taejon site and was attended by 11 participants from 11 RCA Member States: China, Japan, Mongolia and Singapore did not send representatives. There were 22 observers from the Republic of Korea. The full list of participants and observers is given in Annex 1.

The Meeting was opened by Dr. Byung-Koo Kim, Senior Vice President of KAERI. He welcomed the participants to the Republic of Korea and to KAERI. He noted that, for many, it was their first visit to the Taejon facilities. He said that KAERI was very proud to have the opportunity to host this Project Formulation Meeting and that this Meeting's consideration of the future activities in Research Reactor Utilization was very appropriate since KAERI would be bringing its new 30 MW Research Reactor KMRR on-line in late 1994. He emphasized the strong commitment of KAERI and his Government to RCA and said that KAERI facilities would be available to support the programme. In his concluding remarks Dr. Kim expressed the hope that all participants would enjoy their stay in Taejon and would be able to take advantage of the local amenities.

The IAEA Project Technical Officer, Mr. K.M. Akhtar, welcomed the participants to the Meeting on behalf of the IAEA and thanked the Government of the Republic of Korea and KAERI for agreeing to host the PFM. He paid tribute to the excellent organization that had been made for the support of the Meeting and thanked specifically Dr. Huhn-Jun Kim for his efforts as the Country Coordinator and Counterpart.

Dr. Huhn-Jun Kim was nominated to be Chairman of the Opening Session by Dr. Rao, India and this was seconded by Mr. Cabalfin, Philippines, Dr. Molla, Bangladesh and Mr. Arbie, Indonesia. Dr. Kim was duly elected by unanimous decision of the participants.

Following the election of the Chairman, each of the Meeting participants and the senior observers gave a short introduction of themselves.

The draft Agenda (Annex 2) was amended to take account of the absence of participants from China, Japan, Mongolia and Singapore.

Dr. J.F. Easey, RCA Coordinator, presented an overview of the RCA programme detailing the features of the 1993 activities and giving an analysis of the various projects and the associated budgetary support. Annex 3 contains copies of the overhead transparencies used for this presentation.

Mr. Akhtar presented a review of the activities for the first phase of this project (Annex 4). In addition to the details on training courses present in this paper, it was noted that there would be another event still to contribute to this programme. From 22 November to 10 December 1993 there would be a Regional Workshop funded by India on "Applied Aspect of Neutron Scattering" at BARC.

II. COUNTRY REPORTS

Country Reports were given orally by the participants and these were discussed following each presentation. The reports are listed in the Annexes as follows :

Bangladesh	Annex 5
India	Annex 6
Indonesia	Annex 7
Republic of Korea	Annex 8
Malaysia	Annex 9
Pakistan	Annex 10
Philippines	Annex 11
Thailand	Annex 12
Viet Nam	Annex 13

Following the Country Reports, there was a presentation from Mr. P. Bull, Australia, which reviewed the situation with regard to research reactors in that country. Of particular note was information concerned with the details and analyses of materials presented in a recent proposal supporting a case for the Australia Government to invest in the establishment of a new research reactor. These materials had been part

of a submission to a Review Committee set up by the Government to decide whether there was a case for the new research reactor. These materials were of interest to many Member States, particularly one conclusion that the cost of a research reactor could not be justified solely on commercial grounds.

Mr. Bull also briefed the Meeting on the report of the Review Committee, which, for a variety of reasons, had recommended that a decision be deferred for five years, pending developments on other matters, particularly arrangements for spent fuel storage or disposal. The text of Mr. Bull's presentation is given in Annex 14.

Dr. Easey gave a briefing to the participants on the way in which proposals for future activities would have to be set out. He emphasized the need to have project proposals that were specifically and exactly defined, with quantifiable outputs. He again emphasized that the RCA programme was largely supported by extrabudgetary finance and this made it essential that all proposals should conform to the highest standards and should also be in line with the requirements of existing and possible additional donor countries. This latter requirement meant that the projects should: have quantifiable outputs; be concerned with readily achievable goals that would benefit a wider community than the narrow interests of a particular research institute; and be specifically defined in terms of a logical sequence of activities within a specified timeframe.

The specific layout and strategy to be used was explained using the example of a previous PFM report. A copy for the overhead transparencies used for this presentation is given in Annex 15.

III. TECHNICAL SESSION

Dr. Easey was nominated by Dr. Huhn Jun Kim to be Chairman for this session and was elected unanimously.

The session was characterized by a review of various possibly suitable topic areas, followed by an interactive analysis from participants and then development of the themes and issues to determine the extent of the regional character, the regional need and the overall priority. The National Coordinators' experience and expertise were extensively used in the development of possible themes.

In the presentation of the Country Reports and the subsequent discussions, there were several potential areas of need raised by a number of the National Coordinators.

Firstly, there was a general regional interest in research reactors, since only three of the RCA Members States, Singapore, Sri Lanka and Mongolia, out of the fifteen current members did not have research reactors. This was further reinforced because most of these reactors were now 10 or more years old and the problems associated with their age and the ageing of such infrastructure as: the instruments; buildings; ventilation systems; inspection procedures; and, the like, were common features. There was also a common factor in the national programmes for education and training aspects involving research reactors.

Secondly, a number of participants spoke of the need to have more people informed on the beneficial applications that research reactors could be utilized for and there was some frustration that the wider scientific and industrial community was not better aware of some of the unique solutions to problems that could be achieved through the use of neutron techniques. There were examples from some countries that their Governments were becoming more insistent on Nuclear Research Institutes earning money, for example by the commercialization of services available through the utilization of installed facilities such as research reactors.

In the discussions on specific areas of utilization of research reactors for each country, there were many common topics which covered the broad range of use of neutrons for such topics as :

- neutron scattering
  - powder diffraction
  - crystallography
  - small angle scattering
  - polarized neutron analysis
  - inelastic scattering
- neutron activation analysis
- neutron radiography
- silicon transmutation doping
- radioisotope production
- materials testing

In identifying where the regional needs were, it was also necessary to identify which would be the best and most appropriate means, within the IAEA mechanisms, for delivering the required assistance to Member States. It was seen that the Technical Cooperation Projects were the correct vehicle for introducing developed technology whereas the Coordinated Research Programmes were the more appropriate means for continuing research investigations and developing technology. It was also recognized that there were areas of potential overlap with other parts of the RCA programme and that there was a general need to consider that the research reactor based component being decided at this Meeting was concentrated in those features associated with the set up and performance of the neutron-related facility.

In some applications of neutrons, there were now some well-demonstrated opportunities for applied work and some countries were earning significant amounts of money from them. The Meeting recognized that commercial interests could limit cooperation and technology transfer.

The Meeting acknowledge the useful role of the IAEA in promoting and supporting to research reactor utilization for RCA Member States during the first phase of this project from 1990 to 1993 as well as the associated CRP. These inputs have had a good impact. The Meeting agreed that in any second phase, it was necessary to move from the general coverage of the Research Reactor Utilization area to specific application areas. This focus and concentration would make better use of project funds and would give a better scope for interaction between the various National Institutes. There were a number of potentially suitable topic areas put forward and considered. The Meeting decided, after long discussion and consideration of these, taking account of the realistically available resources, that the most appropriate topic to put forward as a continuation of the RCA Technical Cooperation Project on Research Reactor Utilization, would be one concerned with small angle neutron scattering. In the area of the Coordinated Research Programme, it was decided that the most appropriate topic should be on the development of the spectrometers' components and the design of modular systems to support neutron diffraction experiments.

There was an additional decision from the Meeting that a request be put to the IAEA to make available a modest amount of funding to allow the investigation of whether the subject of Neutron Radiography could be developed into a

regional programme because of its potential to raise the commercial as well as the overall utilization of research reactors and thus make a wider impact in the community.

IV. CONCLUSIONS AND RECOMMENDATIONS

The Meeting agreed that the range of training activities carried out since 1990 had made an effective contribution to the objectives of the project in optimizing the use of research reactors. The extrabudgetary support from the Governments of China and India in funding some of the training events was gratefully acknowledged.

The Meeting agreed that:

- the use of a National Coordinator network for this project would assist in achieving a high standard and high level of regional management and optimizing the efficient use of regional resources;

- proposals be put to the 1994 RCA Working Group Meeting for the extension of the project to a second phase for 1995-1999 which would have two major components. One would be a Technical Cooperation Project on Small Angle Scattering. The other would be a Coordinated Research Programme on the development of components and the design of modular components for improved neutron diffraction work. A third minor activity would be the support of an expert review of the status of the capability in each Member State for carrying out commercial standard neutron radiography as a means of evaluating whether there would be sufficient infrastructure to support a regional project on this topic targeted at bringing in new users for this technology.

- there was a need for regionally harmonized protocols for neutron radiography and that this and a need for accreditation would be crucial factors in the development of the wider use of the technology and also the possibilities for commercialization.

- Neutron Activation Analysis and Radioisotope Production were important aspects of the overall utilization of Research Reactors but were not part of the scope of this project. Since these activities were also those that had the maximum commercial potential, it was important to have full information on this aspect in order to have an integrated picture of the total outputs from the utilization of Research Reactors.

- the highest priority for any component of this project supported from the Coordinated Research Programme should be given to the new proposal on the development of spectrometer components and the design of modules.

RECOMMENDATIONS FOR FUTURE 5 YEAR PROGRAMME 1995-1999

1. Technical Cooperation Project

Immediate Objective: To increase the regional capability and awareness of modern developments in neutron scattering technology, specifically small angle scattering, and their applications to materials characterization.

Output 1: Two scientists in each participating Member State trained in the use and the applications of Small Angle Scattering (SANS) techniques.

Activities for Output 1:

1.1 Regional Workshop on basic techniques, applications and utilization of SANS
1.2 Regional Workshop on advanced techniques for SANS
1.3 Fellowship training in SANS at regional centres
1.4 Expert support
1.5 Regional Seminar on applications of SANS to technical and scientific problems
1.6 National Seminars/Workshops on SANS
1.7 Meeting of National Coordinators

The timetable for these activities is given in Annex 16. The scope of activity 1.1 is given in Annex 17.

2. Coordinated Research Programme

Title

Regional Coordinated Research Programme on Design and Development of Spectrometer Modules to Enhance Neutron Beam Research

Expected 9 Research Contracts and 2 Research Agreements

3. Pre-project Evaluation

Two Neutron Radiography experts will review the current capabilities in each participating Member State and report on whether these are adequate enough to provide meaningful services to users outside their immediate institute.

This report would be submitted to the National Coordinators Meeting planned for 3rd quarter 1996 where further consideration would be given to the practicability of having neutron radiography as a meaningful and productive application project within the TC programme.

Support required for this pre-project evaluation is estimated to be a total of six man months, 3m/m 1995 and 3m/m 1996.

OTHER RECOMMENDATIONS

TO MEMBER STATES

1) Member States, who would like to make their research reactor facilities available to other RCA Member States so that there can be increased bilateral cooperation, are requested to provide full details of the particular facilities to the RCA Coordinator, who will circulate this information to all participating Member States.

2) Member States should take advantage of the significant pool of experience and facilities available in the region and make their best efforts to increase TCDC through strengthening bilateral contacts and making positive efforts to achieve practical utilization of these resources.

TO IAEA

1) The IAEA is requested to make available sufficient resources to enable TCDC on Research Reactor Utilization exchange to be adequately implemented.

2) The IAEA is requested to reconsider the priorities for the future CRP programme. The Meeting recommended that the top priority be given to the present proposal on the design of spectrometer modules, since this is better aligned to the new focus of the project towards improving the applications and the equipment capabilities.

3) The IAEA is requested to make information available on the financial management and commercialization of Research Reactors to assist Member States in adapting and planning future programmes in an environment of declining financial support from Government and increased emphasis on generating revenue and commercialization.

V. CLOSING SESSION

Each National Coordinator reviewed the draft report on a page-by page, line-by-line basis. The editorial changes were noted and encorporated into the final report, which was then endorsed by them and adopted as the formal record of the Project Formulation Meeting and its consensus conclusions and recommendations.

Dr. Huhn-Joon Kim, on behalf of KAERI, expressed his pleasure at the outcome of the Meeting, which he felt was very fruitful. He was certain that the proposals for the second phase would result in a very useful programme that would increase the technical capabilities for the Member States and could assist in providing enhanced capabilities particularly in materials science research. He noted that KAERI would be bringing several new facilities on-line during the second phase of this work and these could be shared with others in RCA.

Each of the National Co-ordinators made a short speech concerning the Meeting and its outcome. All expressed their gratitude to KAERI and to the IAEA for their efforts in making the Meeting possible. The special contribution of Dr. Kim was gratefully acknowledged. The National Coordinators from India and Indonesia also joined with the Republic of Korea in making offers of the use of their facilities to other RCA Member States.

There was one remaining major event yet to be carried out under the Phase I of the project. This was a Regional Training event. Preliminary discussions had been carried out with the Government of Australia on their possible hosting of this event in conjunction with the 9th Pacific Basin Nuclear Conference to be held in Sydney 1-6 May 1994.

The National Coordinators agreed that it would be most appropriate to have this linkage and they also recommended that content of the Regional event should deal with the two major applications discussed during this PFM: small angle neutron scattering (SANS) and neutron radiography. The agreed scope of the Regional Workshop is outlined in Annex 18.

VI CLOSING REMARKS BY IAEA

Mr. Akhtar echoed the thanks of the other participants to KAERI and Dr. Kim for their efforts in bringing about such a well supported Meeting. He looked forward to the next phase of this project and said that the sharing of facilities would enhance mutual co-operation.

Dr. Easey endorsed all the congratulatory remarks concerning the contribution of both the Government of the Republic of Korea and KAERI to the smooth running and conduct of the Meeting. He especially thanked Dr. Kim and the secretariat who had enabled the Meeting to run to its tight time schedule and had backed it so effectively that all participants had been able to have the draft report on the final day. He thanked all the National Co-ordinators for their inputs and their co-operation in developing their proposals to an effective consensus format that could achieve a significant contribution to the RCA programme. In conclusion he wished all participants a safe journey back to their homes and said that everyone would have fond memories of their time in Korea.

TIME TABLE FOR PROPOSED ACTIVITIES WITHIN TC PROGRAMME

Year	Period	Activity	Type
1995	First half	1.1	RW
	all year	1.3	Fell
	all year	1.4, 1.6	Exp
	[all year	PPE	Exp]
1996	[First half	PPE	Exp]
	all year	1.3	Fell
	Third Quarter	1.7	NCM
1997	Second half	1.2	RW
	all year	1.3	Fell
	all year	1.4, 1.6	Exp
1998	Second half	1.5	RW/RS
	all year	1.4, 1.6	Eval
1999	all year	1.4, 1.6	Exp
	all year	1.3	Fell
	Second half	1.7	NCM(PFM)

RW - Regional Workshop
RS - Regional Seminar
Fell - Fellowships
Exp - Experts
NCM - National Coordinators Meeting
Eval - Evaluation
PFM - Project Formulation Meeting
PPE - Pre-project Evaluation

REGIONAL WORKSHOP ON BASIC APPLICATIONS OF SMALL ANGLE NEUTRON SCATTERING(SANS)

Timing : - First half 1995

Duration : - Three weeks

Location : - Member States to offer

Target Group : Young graduates or preferably post graduates with some experience in X-ray or neutron diffraction

Purpose of Workshop :

- o To provide "hands on" experience to enable the participants to appreciate the practical application of SANS
- o To give basic instruction on SANS, covering the techniques, sources and instrument factors
- o To inform on the scope of applications

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REGIONAL WORKSHOP ON RESEARCH REACTOR UTILIZATION - 3 WEEKS

Duration: 3 weeks

Location: ANSTO, Australia

Timing: April/May 1994

Target group: Senior Scientific Managers/Senior Research Scientist with a background in Research Reactor Utilization and Neutron Physics

Emphasis: This Workshop will act as a link to the 2nd Phase and will emphasize Neutron Beam Utilization

- Major Emphasis on Small Angle Neutron Scattering (SANS) and Neutron Radiography
- Some discussion of other utilization of research reactors including radioisotope production and neutron activation analysis
- Demonstrations and Hands-on experience for the participants in SANS and Neutron Radiography
- Integrate with the 9th Pacific Basin Nuclear Conference
- Country Presentations from participants will be required.

P r o s p e c t u s

Title:	REGIONAL (RCA) TRAINING COURSE ON CALCULATION AND MEASUREMENT OF NEUTRON FLUX SPECTRUM FOR RESEARCH REACTORS
Place:	Pasar Jumat Training Centre, Centre for Multipurpose Reactor, Serpong (Jakarta), Indonesia
Date:	27 September - 15 October 1993
Deadline for nominations:	15 June 1993
Organizers:	The International Atomic Energy Agency in co-operation with the Governemnt of Indonesia through the National Atomic Energy Agency.
Language:	English
Participation:	The training course is open to 14 participants from developing RCA Member States in the Asia and Pacific region.
Purpose of the course:	The purpose of the course is to provide theoretical knowledge and practical training to the participants on the techniques and methodology for calculating and measuring neutron flux spectrum in the research reactors. This will support efficient utilization for experiments, production of radioisotopes and operation of the reactor.
Nature of the course:	The course will consist of lectures, exercises using personal computers, experimental measurements. Following topics will be covered in the course:

- Neutron spectrum calculations
  Input data files
  Diffusion calculations
  Basic neutron transport calculations
  Analytical solutions
  Numerical solutions

- Neutron flux and spectrum measurements by activation method
  Characteristic neutron spectra in nuclear reactors
  Integral spectrum characteristics, spectral indices
  Neutron activation method for flux and spectrum measurements
  Activation detectors, neutron self shielding
  Spectrum adjustment, uncertainty in the adjusted spectra

- Experimental measurements.

Participants' qualifications:	Participants should be scientists and engineers having basic knowledge in theoretical and experimental reactor physics and familiar with neutronic calculations and computer codes.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must ve received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 June 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

Language certificate:

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

Administrative and financial arrangements:

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

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

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

Prospectus

Title: REGIONAL (RCA) WORKSHOP ON APPLIED ASPECTS OF NEUTRON SCATTERING

Place: Bhabha Atomic Research Centre (BARC), Bombay, India.

Date: 22 November - 10 December 1993

Deadline for nominations: 30 June 1993.

Organizers: The Government of India through the Department of Atomic Energy, Bhabha Atomic Research Centre, in co-operation with the International Atomic Energy Agency.

Language: English.

Participation: The workshop is open to 15 participants from developing RCA Member States in the Asia and Pacific region.

Purpose of the workshop: The purpose of the workshop is to familiarise the participants with the neutron scattering techniques and their applications in characterisation of materials and engineering components.

Nature of the workshop: There will be lectures on basics of neutron scattering and its materials science, metallurgy, chemistry and engineering.

The lectures will cover:

- Basics of neutron scattering (experimental and theoretical aspects)
- Diffraction from polycrystalline samples
- Probing magnetic materials
- Study of textures
- Measurement of residual stress
- Application of Small Angle Neutron Scattering (SANS) in metallurgy and chemistry.

Demonstration experiments using neutron beam facilities set up at DHRUVA and CIRUS reactors will also take place. These will include:

- Powder diffraction
- Polarised neutron diffraction
- Small Angle Neutron Scattering
- Residual stress measurement
- Neutron radiography.

Participants' qualifications: Candidates should be scientists/engineers preferably below the age of 35 years with at least a Master's degree in science or Bachelor's degree in engineering. Experience in X-ray or neutron diffraction techniques with aptitude for materials preparation would be desirable.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 30 June 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

A copy of the nomination form along with the attached completed Personal Data Sheet duly filled should also be sent to the Coordinator of the Workshop at the address given below:

Dr. S.K. Paranjpe
Solid State Physics Division
Bhabha Atomic Research Centre (BARC)
Trombay
Bombay 400 085
India

Telex: 011-71017 BARC IN
Phone: (91) 22-556 3060, ext.: 4306 or 2010
Fax: (91) 22-556 0750

Language certificate:

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

Administrative and financial arrangements:

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

The Government of India will, out of its contribution to RCA, pay the costs of the participants' accommodation in Bombay, their air travel from their home countries to Bombay and return, and pay the participants a stipend sufficient to cover the costs of their meals and incidental expenses.

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

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

Project Description: This project aims at strengthening co-operation among RCA Member States in energy, electricity and nuclear power planning with special emphasis on the IAEA's computer models. Following the recommendations of the Project Formulation Meeting for the Second Phase of the project held in Jakarta, 19-23 July 1993, it has been suggested to extend the scope of the project to include identification of the problems associated with the implementation of nuclear power programmes in the region with the view to establishing effective strategies for introduction of nuclear power. If approved, the second phase will include organization of training courses, workshops, expert meetings and country case studies. A complete description is given in the Project Formulation Report which is available on request.

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

Project Officer: P. Molina

Major Activities and Achievements in 1993:

1. Project Formulation Meeting for Second Phase of the Project, Jakarta, Indonesia, 19-23 July 1993.

Time-table for Planned Activities in 1994:

1. Expert Advisory Group, First Quarter 1994.
2. Expert Advisory Group, Second Quarter 1994.
3. Expert Advisory Group, Third Quarter 1994.
4. Expert Mission to one selected RCA Member State, Fourth Quarter 1994.

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PROJECT FORMULATION MEETING ON ENERGY AND NUCLEAR POWER PLANNING BATAN, JAKARTA, INDONESIA 19-23 JULY 1993

I. OPENING SESSION

The Welcome Address was given by Mr. Adiwardoyo, Director of the Center for Nuclear Energy Studies of the National Atomic Energy Agency of Indonesia (BATAN). The complete text is given in Annex 1.

Dr. John Easey, RCA Co-ordinator, IAEA, welcomed the participants to the meeting and took the opportunity to express IAEA's gratitude to the Indonesian Government for agreeing to host the meeting. He briefly reviewed the RCA programme, emphasizing the regional character of the projects and the accomplishments achieved so far, detailing some of the past and future projects.

Mr. Pablo Molina, Technical Officer for the project on Energy and Nuclear Power Planning, IAEA, also expressed gratitude to the Indonesian Government for hosting the meeting and in particular to BATAN for the excellent organization provided.

Dr. Iyos Subki, Deputy Director General for Nuclear Science and Technology of the National Atomic Energy Agency of Indonesia (BATAN), delivered the Official Address and declared the meeting opened. In his remarks, he emphasized the efforts being made by Indonesia for the introduction of nuclear power into the country's electrical grid. The complete text is given in Annex 2.

Mr. John Landels (Australia) was nominated as Chairman of the Technical Session by Philippines and elected by general acclamation of all participants. The full list of participants is given in Annex 3.

The proposed agenda was modified in order to accommodate for initiation of the sessions earlier than expected (8h30 in the morning) in order to give more opportunities for extended discussions. The sessions on country reports were adjusted to allow for presentations by all countries represented in the meeting. The agreed agenda is shown in Annex 4.

The meeting continued with presentations by the IAEA related to the general frame of the Regional Co-operative Agreement for Asia and the Pacific (RCA) and the particular RCA project on Energy and Nuclear Power Planning.

Dr. John Easey made a detailed presentation on the RCA activities and emphasized the success of this project and its importance for channeling co-operative efforts within the region. The sources of financing for this project were also reviewed to highlight the extra-budgetary contributions of some of the Member States participating in the project and that of UNDP. For the particular project on energy and nuclear power, these sources have also come from the Asian Development Bank (ADB) in recognition of the benefits that it brings to the region.

Mr. Pablo Molina presented more details about the number of activities organized as part of Phase I of the Energy and Nuclear Power Project and the number of experts from the region who participated in the Workshops and Training Courses held at different venues. Emphasis was made to the contributions received from international organizations to support this project and guarantee its success. Apart from ADB, other organizations such as ESCAP, World Bank, etc., have been very effective in this support. He then detailed the truly regional nature of the project as demonstrated by the large number of experts from the region who

acted as trainers in the regional training courses based on the IAEA's WASP model organized in Kuala Lumpur, Malaysia (1989) and Lahore, Pakistan (1992). He went on to indicate what possibilities are open for further co-operation under the project and listed some new planning models being offered by the IAEA that can be considered for future training courses and other activities under the project. The full text of the presentation is given in Annex 5.

II. COUNTRY REPORTS

Reports were presented by the participants on the status of energy, electricity and nuclear power planning in their countries:

Bangladesh	-	Annex 6
Peoples Republic of China	-	Annex 7
India	-	Annex 8
Indonesia	-	Annex 9
Republic of Korea	-	Annex 10
Malaysia	-	Annex 11
Mongolia	-	Annex 12
Pakistan	-	Annex 13
Philippines	-	Annex 14
Sri Lanka	-	Annex 15
Thailand	-	Annex 16
Vietnam	-	Annex 17

A special report was also presented by Mr. John Landels (Australia). The text is given in Annex 18.

Each presentation was accompanied by a period of general discussions.

III. TECHNICAL SESSION

The RCA Coordinator briefed the participants on the format to be followed for the preparation of the Meeting Report, describing in detail the purpose behind this procedure and providing specific examples for document presentation.

It was a general consensus among participants that the first phase of the project has been useful in providing some regional experience in the use of the WASP methodology and in providing an excellent forum for effective exchange of experiences in energy, electricity and nuclear power planning among the participating countries.

A round of country proposals determined the individual needs for future co-operation within the project. These were analyzed in detail in order to identify the areas of common interest. These are expressed as needs for:

- Continuation and expansion of the training courses on the IAEA's planning models to cover not only WASP, but also the MAED and ENPEP methodologies.

- Improvement of the information to integrate national databases for the conduct of energy and nuclear power planning analyses.

- Identification of the problems associated with the slow pace of implementation of nuclear power in the region with a view of establishing effective strategies for nuclear power implementation.

The above needs were then formulated in terms of several outputs and objectives as detailed in IV below.

The meeting requested that there should be a National Coordinators Meeting by mid-term of the second phase of the project to review and report on the progress and implementation of the project and make any necessary adjustments to the programme. Another National Coordinators Meeting should be organized at the end of this phase of the project to review the project's accomplishments and prepare a final report, and to make any further recommendations on regional needs in this area.

The meeting also urged the Agency to provide financial resources to enable the second phase of the project. The full text of the conclusions and recommendations of the meeting is given in Annex 19.

IV. RECOMMENDED FUTURE 5-YEAR PROGRAMME

Overall Objective

To further promote regional co-operation among RCA countries in the field of energy, electricity and nuclear power planning.

Objective 1:

To enhance and improve the reliability and quality of forecasting, planning and analytical capabilities in the region for future energy and electricity needs and impacts.

Output 1.1:

One core team to be established in each participating RCA Member State experienced in the use of MAED, WASP and ENPEP methodologies.

Activities for Output 1.1:

1.1.1 Regional Training Course on ENPEP
1.1.2 Regional Training Course on MAED
1.1.3 Regional Training Course on WASP
1.1.4 National Training on ENPEP, MAED, WASP
1.1.5 Expert Assistance and Evaluation.

Output 1.2:

Recommendations on strategies to improve input information for energy, electricity and nuclear power planning with emphasis on the requirements of the WASP model.

Activities for Output 1.2:

1.2.1 Meeting of National Experts to report and review the problems with input information and processing and define the areas requiring attention.
1.2.2 Expert Advisory Group Meeting to assemble representative data to illustrate specific case study needs.

1.2.3 Expert mission to at least four countries to observe and participate in specific case analyses.
1.2.4 Expert Advisory Group Meeting to review the outcome of the specific case analyses and prepare a final report with recommendations.

Objective 2:

To facilitate national implementation of nuclear power programmes through the pooling and analysis of information on effective strategies used in RCA Member States.

Output 2.1:

Analysis of recent strategies and recommendations for successful implementation of nuclear power projects in RCA Member States.

Activities for Output 2.1:

2.1.1 Expert Advisory Group Meeting on identification of problem areas and production of guidelines for the preparation of national reports.
2.1.2 Preparation, nationally, of reports on problems in identified areas as input for a Regional Workshop.
2.1.3 Regional Workshop to analyze and make recommendations on effective strategies for implementation of nuclear power projects.

Objective 3:

To monitor the effectiveness of the second phase of the project and its implementation and recommend appropriate actions.

Output 3.1:

Reports on the project programme and implementation.

Activities for Output 3.1:

3.1.1 Meeting of National Coordinators for mid-term project review.
3.1.2 Meeting of National Coordinators for final project review.

The proposed detailed schedule of activities to meet the above programme is given in Annex 20.

V. OTHER MATTERS

Participants emphasized the need to centralize all IAEA information and documents related to the project through the National Coordinators as a means to guarantee the successful implementation of this second phase of the project. Although the same information is available at the National Atomic Energy Agencies and Official Correspondents of the IAEA in the country, the project technical officer promised to send all relevant information to each of the National coordinators, expanded with other documentation describing the IAEA's planning methodologies. He emphasized the need to have this documentation available for perusal and reference by the country representatives to each of the activities envisaged in the second phase of the project.

The report was reviewed by the participants in the draft stage and after amendments it was agreed to be a correct record.

The participants unanimously resolved to congratulate Dr. J.F. Easey on the efficient manner in which he had conducted the meeting and the formulation of the next 5-year programme.

VI. CLOSING REMARKS

The RCA Coordinator summarized the activities of the Meeting and thanked all participants for the effective way in which they approached the formulation of the future programme for the project. He also congratulated and thanked the Government of Indonesia and the National Atomic Energy Agency, BATAN, for agreeing to host the Meeting and for the excellent organization provided. Specific thanks were directed to the Secretariat integrated by BATAN staff who had looked after all the administrative needs so well and efficiently. The list of the Secretariat for this Meeting is given in Annex 21.

The Meeting was formally closed by Mr. Iyos Subki of BATAN who also thanked the IAEA for having agreed to organize the meeting in Indonesia. He also thanked all participants for the productive discussions held during the meeting and the important recommendations for continuation of the project.

PROJECT FORMULATION MEETING ON RCA PROJECT "ENERGY AND NUCLEAR POWER PLANNING" (RAS/0/013) BATAN, JAKARTA, INDONESIA 19 - 23 JULY 1993

CONCLUSIONS AND RECOMMENDATIONS

The Meeting agreed that the first phase of this project has been useful in providing some regional experience in the use of the WASP methodology. The value of the regional workshops on energy, electricity and nuclear power planning in providing a forum for effective exchange of experiences was also recognized.

The Meeting identified three major areas of need for the future under the general field of Energy, Electricity and Nuclear Power Planning.

The first was a recognition that there was a regional need for further training courses in WASP and for the introduction of training courses in MAED and ENPEP.

It was recommended that the regional training programme on these methodologies should continue and be expanded within this project. During the next five-year phase of this project it would be an objective to establish a core of trained and experienced personnel in each country who could be self-sufficient in the operation and use of the ENPEP, MAED and WASP computer programs.

The use of the regional training programme to train trainers who can then support national training programmes utilizing the skills of national and regional experts was seen to be the most efficient use of resources to achieve this objective.

The ability to use ENPEP to obtain estimates of the long term yearly balance of energy demand and supply, as well as the resource requirements and environmental emissions of the selection of various combinations of energy and electricity chains (production/transformation/transport/use) was seen to be an important expansion of the energy planning methodology.

The integration of MAED into the planning procedure of the participating countries would allow them to conduct detailed analyses of the long term demand for energy in all its forms, including electricity, which would enable a more systematic determination of the market in which all electricity generation technologies, including nuclear power, can be competing in the WASP analysis.

The second area to be addressed was that of input information for conducting energy and nuclear power planning analyses. It was reported by many participants that there were problems in preparing input information with regard to reference data and country specific data and that the pooling of mutual experience could be beneficial in providing improved inputs. It was recommended that this second phase of the project should address this problem.

The last area identified was concerned with the problems associated with the slow pace of implementation of nuclear power in the region. The Meeting noted that in RCA countries there appeared to be barriers to the planning and implementation of national nuclear power programmes which might be effectively dealt with using examples from strategies utilized in RCA Member States. The areas recognized as requiring inputs extend across financial planning, siting, bid preparation and evaluation, construction, management of nuclear power projects, and other related areas. This was recognized as being important. There was a common view that pooling regional experience in dealing with these problems could be mutually beneficial and might significantly facilitate the progression and expansion of the nuclear power programme in the RCA countries.

The contribution of the Republic of Korea in supporting regional training on pre-project planning for nuclear power plants during the first phase of this project was recognized by the Meeting as a valuable input to the general area of facilitating the introduction of nuclear power. It was felt that, in the future, RCA activities on Energy and Nuclear Power Planning should be further strengthened to include pre-project activities, project implementation, etc., as mentioned above

It was recommended that there would be a National Coordinators' Meeting in 1996 to review and report on the progress and implementation of the project activities and make any necessary adjustments to the programming to ensure that the project meets the then current needs. There would be another National Coordinators' Meeting at the end of this phase of the project in 1998 to review and prepare a final report and make any further recommendations on regional needs in this area.

RECOMMENDED FUTURE 5-YEAR PROGRAMME

Overall Objective

To further promote regional co-operation among RCA countries in the field of energy, electricity and nuclear power planning.

Objective 1:

To enhance and improve the reliability and quality of forecasting, planning and analytical capabilities in the region for future energy and electricity needs and impacts.

Output 1.1:

One core team to be established in each participating RCA Member State experienced in the use of the MAED, WASP and ENPEP methodologies.

Activities for Output 1.1:

1.1.1 Regional Training Course on ENPEP
1.1.2 Regional Training Course on MAED
1.1.3 Regional Training Course on WASP
1.1.4 National Training on ENPEP, MAED, WASP
1.1.5 Expert Assistance and Evaluation.

Output 1.2:

Recommendations on strategies to improve input information for energy, electricity and nuclear power planning with emphasis on the requirements of the WASP model.

Activities for Output 1.2:

1.2.1 Meeting of National Experts to report and review the problems with input information and processing and define the areas requiring attention.
1.2.2 Expert Advisory Group Meeting to assemble representative data to illustrate specific case study needs.
1.2.3 Expert mission to at least four countries to observe and participate in specific case analyses.
1.2.4 Expert Advisory Group Meeting to review the outcome of the specific case analyses and prepare a final report with recommendations.

Objective 2:

To facilitate national implementation of nuclear power programmes through the pooling and analysis of information on efective strategies used in RCA Member States.

Output 2.1:

Analysis of recent strategies and recommendations for successful implementation of nuclear power projects in RCA Member States.

Activities for Output 2.1:

2.1.1 Expert Advisory Group Meeting on identification of problem areas and production of guidelines for the preparation of national reports.
2.1.2 Preparation, nationally, of reports on problems in identified areas as input for a Regional Workshop.
2.1.3 Regional Workshop to analyze and make recommendations on effective strategies for implementation of nuclear power projects.

Objective 3:

To monitor the effectiveness of the second phase of the project and its implementation and recommend appropriate actions.

Output 3.1:

Reports on the project programme and implementation.

Activities for Output 3.1:

3.1.1 Meeting of National Coordinators for mid-term project review.
3.1.2 Meeting of National Coordinators for final project review.

PROJECT FORMULATION MEETING ON RCA PROJECT "ENERGY AND NUCLEAR POWER PLANNING" (RAS/0/013) BATAN, JAKARTA, INDONESIA 19 - 23 JULY 1993

PROPOSED SCHEDULE OF ACTIVITIES

Year	Period	Activity	Type
1994	First Quarter	1.2.1	EAGM
	Second Quarter	2.1.1	EAGM
	Third Quarter	1.2.2	EAGM
	Fourth Quarter	1.2.3	EM
1995	1st to 3rd Quarter	2.1.2	NR
	1st to 4th Quarter	1.2.3	EM (x 3)
	Second Quarter	1.1.1	RTC
	Fourth Quarter	2.1.3	EAGM
1996	First Quarter	1.2.4	EAGM
	1st to 4th Quarter	1.1.4	NTC (6 EM)
	Second Quarter	1.1.2	RTC
	Fourth Quarter	3.1.1	NCM
1997	1st to 4th Quarter	1.1.4	NTC (6 EM)
	1st to 4th Quarter	1.1.5	EM (x 6)
	Second Quarter	1.1.3	RTC
1998	1st to 4th Quarter	1.1.4	NTC (6 EM)
	1st to 4th Quarter	1.1.5	EM (x 6)
	Second Quarter	1.1.1	RTC
	Fourth Quarter	3.1.2	NCM

Legend:

EAGM	-	Expert Advisory Group Meeting
EM	-	Expert Mission
NCM	-	National Coordinators Meeting
NR	-	National Reports
NTC	-	National Training Course
RTC	-	Regional Training Course

TENTATIVE BUDGET FOR THE PROJECT

Year	Experts	Training	Fellowships	Equipment	Activities	Total Cost Estimate
1994	2.5 m/m 1.0 m/m 0.5 m/m 2.5 m/m	-	-	-	1.2.1; 1.2.2; 1.2.3(x 1); 2.1.1	$ 70K
	6.5 m/m	-	-	-		
1995	1.5 m/m 2.5 m/m	$ 200K	-	-	1.1.1; 1.2.3(x 3); 2.1.3	$ 245K
	4 m/m	$ 200K	-	-		
1996	1 m/m 2.5 m/m 8.5 m/m	$ 200K	-	-	1.1.2; 1.2.4; 3.1.1; 1.1.4(x 6)	$ 330K
	12 m/m	$ 200K	-	-		
1997	8.5 m/m 8.5 m/m	$ 200K	-	-	1.1.3; 1.1.4(x 6); 1.1.5(x 6)[1]	$ 400K
	17 m/m	$ 200K	-	-		
1998	8.5 m/m 8.5 m/m 2.5 m/m	$ 200K	-	-	1.1.1; 1.1.4(x 6); 1.1.5(x 6); 3.1.2	$ 415K
	19.5 m/m	$ 200K	-	-		
Grand Totals	59 m/m	$ 800K	-	-		$ 1,460K

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

Project Description: The project is a cooperative venture between RCA Member States designed to build up radiation protection infrastructures in a part of the world where rapid expansion in the application of nuclear techniques to both medicine and industry is confidently predicted. The project will comprise training courses, workshops and coordinated research programme. A complete description is provided in the February 1992 Project Formulation Report, reviewed by the Expert Advisory Meeting in Beijing (February 1993) during which priorities were identified.

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

Project Officer: P. Strohal

Major Activities and Achievements in 1993

1. IAEA/RCA Expert Advisory Meeting on Radiation Protection Infrastructures, held in Beijing, China, on 8-11 March 1993
2. Regional Workshop on Application of the ICRP's 1990 recommendations held in Kuala Lumpur in August 1993
3. Regional Workshop on Radon Monitoring held in Hengyang, China, in September 1993
4. Research Coordination Meeting of the Agency's Research Coordinated Research Programme on "Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man" held in Tianjin, China, in October 1993
5. Expert Advisory Group on Protocols for Measurement and Dosimetry held in Hanoi, Viet Nam, in December 1993
6. Consultants Meeting on Formulation of Requirements for an Offsite Emergency Activity held at the Agency Headquarters in Vienna in November 1993

Timetable for Planned Activities in 1994

1. Expert Advisory Meeting, Melbourne, Australia - February 1994
2. Expert Training Workshop on Preparation of Offsite Emergency Plans and Countermeasures, Melbourne, Australia
3. Regional Training Course on Preparation of Offsite Emergency Plans, Australia - August/September 1994
4. Advisory Meeting on Intercomparison of Radioactivity Measurements for Environmental Samples, Tokai, Japan
5. Regional Training Course on Calibration and Maintenance, Japan - 1994

IAEA/RCA Expert Advisory Group Meeting on "Radiation Protection Infrastructures Project" RAS/9/006 REPORT OF THE MEETING

The IAEA/RCA Expert Advisory Meeting on Radiation Protection Infrastructures Project RAS/9/006 was held at the Mandarin Hotel, Beijing 8-10 March 1993. The Meeting was attended by 19 experts, Mr. Grey (Australia), Dr. Venkataraman (India), Drs. Kobayashi, Minami and Miyabe (Japan) and 12 from China as well as two IAEA officers, Dr. Strohal (Project Technical Officer) and Dr. Easey (RCA Coordinator). The full participants list is given in Annex 1a.

The purpose of the Meeting was:to review the activities carried out in 1992; to review the priority areas established at the Project Formulation Meeting held at Tokai, Japan, 22-26 June 1992 and, in the light of information on the likely extent of extrabudgetary input, develop an action programme for the project to cover the period 1993 to 1997;and,to discuss and approve the activities for 1993.

1. Opening of the Meeting

Dr. P. Strohal delivered a brief opening address on behalf of IAEA thanking the Chinese Government for hosting the Meeting. The speech of welcome was given by Mr. Liu Zunqi, Deputy Director of Bureau of International Cooperation, CNNC. In his remarks, he emphasized the importance of Radiation Protection in the Asia region especially because nuclear power is being developed here. Mr. Liu wished the project success and expressed his great appreciation for the active cooperation of Member States and contributions of the experts to the Meeting.

Dr. Strohal suggested that Dr. Pan Ziqiang, Director, Bureau of Safety, Protection and Health, CNNC should chair the Meeting and this was unanimously accepted. The draft Agenda (Annex 1b) was accepted by the participants.

2. Review of Activities for 1991-1992

2a. Project Formulation Meeting, Tokai

Dr. Kobayashi briefly reviewed the outcome of the Project Formulation Meeting held in Tokai, Japan 22-26 June 1992. Eleven RCA developing Member States had been represented at the Meeting. Only Singapore had not

attended. A total of 47 experts had contributed to a very important document that contained important background material as well as the agreed priorities in ten different subject areas. An extract of the report is given in Annex 2a.

2b. Regional Workshop on "Development of Training Techniques and Methods of Instruction in Radiation Protection" Sydney

Mr. Grey reported current initiatives in Radiation Protection in Australia and also the results of IAEA/RCA workshop on "The Development of Training Techniques and Methods of Instruction in Radiation Protection" held in Sydney on 17-28 February 1992.

The purpose of the Workshop was: 1) to develop and instruct selected RCA participants in the latest educational techniques; 2) to adapt and utilize these techniques in the effective teaching of radiation protection, and 3) to develop uniform and standard training methods in radiation protection. The Workshop was attended by 15 participants from 12 countries.

The Workshop spent 3 days on a "Train the Trainers Course", and 7 days on the utilization of these modern techniques in the effective teaching of radiation protection and the development of standard syllabi. All participants recognized the workshop was successful and very helpful to their training work. A report is given in Annex 2b.

2c. Workshop on Personal Dosimeter Intercomparison Tokai, Japan

Dr. Minami reported on the results of the Personal Dosimeter Intercomparison and the Workshop held in Tokai in October 1992. There was a measurable improvement in the technical capabilities in personal dosimetry and instrument calibration. However there were some problems remaining in individual cases. The report is given in Annex 2c.1. The Agency Technical Officer for this project will be initiating remedial action through IAEA (Annex 2c.2). Dr.Minami indicated continued technical support from Japan in further upgrading Member States capabilities in personal dosimetry.

3. Review of Other Aspects of Radiation Protection Relevant to the Current and Future RCA Programme

The RCA Coordinator, Dr. Easey, briefed the participants on the funding that has been provided to this project over the past eight years (Annex 3a). He pointed out that much of the funding had come from the extrabudgetary donations of Australia and Japan and that the amounts, both in terms of absolute dollars and percentage of the total RCA budget, had varied significantly from year to year, from 3.8% in 1989 to 12% projected for 1994. The average level for the eight years 1987 to 1994 was 7.7%. He suggested

that it would be necessary for some agreement to be reached on what should be the target allocation for the Radiation Protection budget and added that the issue of the distribution of the RCA budget between the various activity areas was likely to be an item considered by the 15th RCA Working Group Meeting at Manila 16-19 March 1993.

The Project Technical Officer, Dr. Strohal, presented an overview of the IAEA Programme in Radiation Protection and reviewed the implications that it would have for the RCA activities and priorities (Annex 3b). He emphasized the need for RCA projects to address topics of general regional interest and also be well harmonized with the overall IAEA Programme to avoid any duplication of effort. He also reminded delegates that the decision of the IAEA Board of Governors had stated that the Agency's Basic Safety Standards should be applied to any IAEA or IAEA assisted project and efforts should be made to achieve increased contributions from the Agency and other countries for radiation protection projects.

The national programmes in radiation protection were reviewed by the delegates from Australia, India, Japan and China (Annexes 3c.1, 3c.2, 3c.3, 3c.4). During their presentations, mention was made to the relevance of these national programmes to future RCA activities. These materials were also inputs in the round table discussion which followed the formal presentations. Of particular note was the review by a Chinese delegate of an accident that had occurred in China at the end of 1992 involving a 10 Ci Cobalt-60 source.

4. Future Programme of RCA Activities

Mr. Grey reviewed the Australian participation in IAEA/RCA and other regional activities with emphasis on those aspects related to radiation protection (Annex 4a.1). Dr. Kobayashi and Dr. Minami presented proposals for future activities:

- a Regional (RCA) Training Course on the "Recent Developments in Basic Techniques of Radiation Protection".

- a Regional (RCA) Training Course on "Calibration and Maintenance of Monitoring Instruments for Radiation Protection".

- IAEA/RCA Intercomparison programme on Radioactivity Measurement for Environmental Samples.

- IAEA/RCA Co-ordinated Research Programme on Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man.

The full materials are given in Annex 4a.2.

There was a full discussion of the issues raised during Session 3. The priorities established at the June 1992 Project Formulation Meeting held in Tokai, Japan were reviewed against the current regional needs and an overall priority listing was produced and endorsed by all the participants.

In establishing these priorities the Meeting stressed that the main goal of this RCA project was to further strengthen the radiation protection infrastructure in Member States and this could be achieved by giving support to the further development of national regulations, radiation protection services and through the continued support of the manpower development activities that would lead to achieving internationally accepted standards of radiation protection.

It was noted that the industrial and medical applications of nuclear technology used a wide spectrum of sources of ionizing radiation and were also the areas where a number of incidents/accidents were being reported. It was the view of the Meeting that radiation protection related to the use of ionizing radiation in industrial and medical applications were of high priority. However the Meeting was also firmly of the view that radiation protection should be a component of the activities for each relevant RCA project, especially in industrial and medical nuclear technology.

The Meeting defined its priorities for the future 5 years as the following, using for consistency the classification headings adopted in the report of the Project Formulation Meeting in Tokai:

1. OFF-SITE EMERGENCY

Objective:

To support establishment of national capabilities in RCA Member States for off-site emergency responses involving radiation sources, nuclear power stations and research reactors.

Output 1:

Recommendations on the regulatory control, safe handling, storage and disposal of sealed sources based on IAEA Safety Series reports covering: medical uses; nuclear gauges; irradiation facilities; and, decommissioning, dismantling, storage and disposal.

Activity for Output 1:

1.1 Consultants Meeting on formulation of legal requirements

1.2 Regional workshop on regulatory aspects for the named areas of importance

1.3 Expert services to advise Member States
1.4 Consultants Meeting to review, revise and finalize recommendations.

Output 2:
A national capability for handling off-site emergency

Activity for Output 2:
2.1 Training workshop on the preparation of off-site emergency plans and countermeasures.
2.2 Participation by RCA countries as observers in planned exercises in countries with well-developed plans.
2.3 Training workshop on assessment of dose arising from a radiological accident.
2.4 Intercomparison Programme on measurement of radioactivity

Output 3:
Established regional network to assist in dose assessment for emergency situations

Activity for Output 3:
3.1 Request national nomination for counterpart network
3.2 Request inventory of national capability
3.3 Consultant workshop on national services to produce procedures and guidance on dose assessment
3.4 Expert reviews of national capabilities
3.5 Fellowship training in dose assessment
3.6 Regional training course on recent developments in basic radiation protection.

2. DOSIMETRY (EXTERNAL AND INTERNAL)

Objective:
To establish regionally harmonized procedures for measurement and dosimetry of ionizing radiation

Output 1:
Regionally harmonized dosimetry and measurement techniques for alpha, beta, gamma, X-rays and neutrons.

Activity for Output 1:
1.1 Expert Advisory Group Meeting to recommend protocols for measurement and dosimetry for alpha, beta, gamma , X-ray and neutron measurement.
1.2 Intercalibration study to evaluate individual laboratory capability for each radiation at various energy ranges.

1.3 Expert Review Meeting
1.4 Regional Training Course on Contamination Monitoring.
1.5 Regional Training Course on Calibration and Maintenance.

Output 2:
Regionally harmonized measurement techniques and dosimetry for radon and thoron

Activity for Output 2:
2.1 Expert Advisory Group meeting to recommend protocols for measurement and dosimetry of radon and thoron.
2.2 Intercalibration study to evaluate individual capability of laboratories
2.3 Expert review meeting
2.4 Regional Training Course on measurement and dosimetry for radon and thoron

Output 3:
Trained specialists on biological dosimetry, including chromosome aberration

Activity for Output 3:
3.1 Expert Advisory Group Meeting to report on the status of biological dosimetry, including chromosome aberration.
3.2 Regional Training Course on biological dosimetry, including chromosome aberration.

3 REFERENCE ASIAN MAN

The meeting discussed the nature and extent of the data so far accumulated from the CRP. It was pointed out that although there was adequate anatomical data, there was not enough physiological data and a serious lack of metabolic data. The meeting noted that recommendations on the future of this project would be part of the discussions and output of the Final Research Coordination Meeting Planned to be held late in 1993.

4 REGULATIONS

Objective:
To assist Member states in understanding and common in implementation of recommendations of ICRP 60 in the region.

Output 1:
Regionally harmonized guidelines for implementation of the ICRP 60 recommendations.

Activity for Output 1:

1.1 Regional expert meeting to review the situation and to prepare draft guidelines.

1.2 Set up national networks incorporating all relevant agencies involved in radiation protection and major organizations affected by the ICRP 60 recommendations.

1.3 National seminars to inform on the consequences of the introduction of the ICRP 60 recommendations and their implementation on a national and regional basis.

1.4 Regional Training on implementation of ICRP 60 regulations.(Full scope of the scheduling needs to be reassessed at the next EAGM)

5 TRAINING IN RADIATION PROTECTION

This is fully described in the Australian Project Document on the "Application of Isotope and Radiation Technology to Regional Development with Special Reference to Industry and Nuclear Medicine" (Annex 5).

Each subject area was then considered from the point of view of the resources required and the timing of the activities. During these discussions the integration of the Agency funded and the extrabudgetary funded activities was also an important consideration. The delegates from China and India noted that the timetables of activities and indicated that they would endeavour to support some future year items. These would be communicated later following appropriate discussions with their respective Governments. Table 1 lists the timetable for the Off-site Emergency components, Table 2 lists the Dosimetry (External and Internal) components and Table 3 lists the Regulations components.

During the discussions Mr. Grey offered assistance with neutron dosimetry and said he would investigate the possibilities of supporting some aspect of the emergency response needs.

A preliminary assessment of the budgetary requirements for the 1993/1994 programme indicated that all components should be able to be supported from the current resources. The Meeting endorsed the programme and asked the Technical Officers and the RCA Coordinator to implement the agreed activities as scheduled.

All participants at the Meeting wished it to be noted by the Agency and the extrabudgetary donors that the future project activities over the five priority areas now formed a complex matrix and that coordination of the total project

with regional priorities and imperatives was still important. The continuation of yearly Expert Advisory Meetings was seen to be a priority and that resources should be set aside for this purpose. The Government of Japan was specifically requested to continue and, if possible increase, its generous financial support for experts from developing countries to enable them to participate at the EAGMs.

It was further recommended that it could be beneficial to rotate the location for the Meeting to various RCA Member States to enable their radiation protection organizations to become conversant with the programme and provide a greater degree of regional input. Mr. Grey offered to host the next Meeting in Australia in February 1994 and this was unanimously accepted.

The Meeting considered the draft report and documents prepared by the Secretariat. The drafts were reviewed on a page by page basis and revised where necessary.

5. ACTIVITIES FOR 1993

The location and timing of a number of the activities could not be immediately ascribed to many of the project activities identified by the EAGM for the 1993 programme.On return to Vienna the Technical Officer Dr. Strohal will, in cooperation with others, identify and arrange these matters and communicate details to the national counterparts.

a) Off-site Emergency
- Consultants Meeting (activity 1.1)
- Training workshop (activity 2.1)
- Workshop on intercomparison of radioactivity measurements for environmental samples, October, Tokai, Japan(activity 2.4)
- Request national nominations for counterpart network (activity 3.1)
- Request inventory of national resourses (activity 3.2)

b) Dosimetry
- Expert Advisory Group Meeting (activity 1.1)

c) Reference Asia Man
- Final Coordination Meeting, Taiyuan, October

d) Regulations
- Regional Workshop, Malaysia, August

e) Training
Development of distance learning materials
Printing and production of distance learning materials

f) Expert Advisory Group Meeting for review and coordination, Australia, February 1994

6. CONCLUSION OF MEETING

The Meeting unanimously agreed that the documents and report should be accepted as representing the consensus view of the participants. The importance of the Radiation Protection Infrastructures project was reemphasized as was the need for all projects utilizing ionizing radiation to have components dealing with the radiation protection issues. The support of the Agency and the extrabudgetary contributions of Australia, China, India and Japan were gratefully acknowledged and all were asked to maintain and increase this support in line with the integrated projected that had now been constructed for 1993-1997.

In his concluding remarks, the RCA Coordinator thanked the Chinese hosts for their effective contribution to the efficient progress of the Meeting and the successful outcome of the deliberations, which had produced a sound basis for the future programme. He went on especially thank the Secretariat for their very hard work and dedication, which had resulted in the efficient and timely preparation of all the documentation required by the participants. Dr. Strohal endorsed Dr. Easey's comments and thanked all participants for their valued and expert contributions to the proceedings.

The Chairman, Professor Pan Ziqiang, also thanked everyone for their technical contributions and especially the Japanese Government for the financial support that had enabled a wider regional view to be taken through the participation of the Indian expert Dr. G. Venkataraman. He expressed his pleasure on the outcome of the Meeting and wished everyone a safe return home.

Table 1

1. OFF-SITE EMERGENCY

Objective:
To support establishment of national capabilities in RCA Member States for off-site emergency responses involving radiation sources, nuclear power stations and research reactors.

Output 1:
Recommendations on the regulatory control, safe handling, storage and disposal of sealed sources based on IAEA Safety Series reports covering: medical uses; nuclear gauges; irradiation facilities; and decommissioning, dismantling, storage and disposal.

Activity for Output 1:
1.1 Consultants Meeting on formulation of legal requirements
1.2 Regional workshop on regulatory aspects for the named areas of importance
1.3 Expert services to advise Member States
1.4 Consultants Meeting to review,revise and finalize recommendations

Output 2:
A national capability for handling off-site emergency

Activity for Output 2:
2.1 Training workshop on the preparation of off-site emergency plans and countermeasures.
2.2 Participation by RCA countries as observers in planned exercises countries with well-developed plans.
2.3 Training workshop on assessment of dose arising from a radiological accident.
2.4 Intercomparison Programme on measurement of radioactivity

Output 3
Established regional network to assist in dose assessment for emergency situations

Activity for Output 3
3.1 Request national nomination for counterpart network
3.2 Request inventory of national capability
3.3 Consultant workshop on national services to produce procedures and guidance on dose assessment
3.4 Expert reviews of national capabilities
3.5 Fellowship training in dose assessment
3.6 Regional Training Course on recent developments in basic radiation protection.

	1993	1994	1995	1996	1997
	6m/w . . .	. $50K 6m/w .	. . 6m/w .	. . . 6m/w	. . . .
	6m/w . . X	. 4m/w IAEA .	. 4m/w . .	. 4m/w . .	. . . JPN
	X X	. . 7m/w . . .	. . . 6m/w 26m/w JPN	. . . 7m/w 26m/w .	. . . . 26m/w .
Sub-total: Experts T/C Fellowships	12m/w --------- ---------	17m/w $50k --------	16m/w -------- 26m/m	17m/w -------- 26m/w	-------- -------- 26m/w

IAEA - regular budget funded activity

JPN - Japanese funded activity

X - project activity planned

- no project activity planned

Table 2

2. DOSIMETRY (EXTERNAL AND INTERNAL)

Objective:
To establish regionally harmonized procedures for measurement and dosimetry of ionizing radiation

Output 1:
Regionally harmonized dosimeter and measurement techniques for α, β, γ, X and neutrons

Activity for Output 1:
1.1 Expert Advisory Group Meeting to recommend protocols for measurement and dosimetry for alpha, beta, gamma, X-ray and neutron measurement
1.2 Intercalibration study to evaluate individual capability for each radiation at various energy ranges
1.3 Expert Review Meeting
1.4 Regional Training Course on contamination Monitoring
1.5 Regional Training Course on calibration and maintenance

Output 2:
Regionally harmonized measurement techniques and dosimetry for radon and thoron

Activity for Output 2:
2.1 Expert Advisory Group meeting to recommend protocols for measurement and dosimetry of radon and thoron
2.2 Intercalibration study to evaluate individual capability of laboratories
2.3 Expert Review meeting
2.4 Regional Training Course on measurement and dosimetry for radon and thoron.

Output 3:
Trained specialists on biological dosimetry, including chromosome aberration.

Activity for Output 3:
3.1 Expert Advisory Group Meeting to report on the status of biological dosimetry, including chromosome aberration.
3.2 Regional Training Course on biological dosimetry, including chromosome aberration.

Sub-total: Experts
T/C

3. PROGRAMME COORDINATION

Expert Advisory Group Meeting (2 IAEA, 3 RCA, 3 Japan, 1 Australia) Sub-total: Experts
(Japan and Australia funding extra, only IAEA funds shown)

1993	1994	1995	1996	1997
6m/w	. X . . JPN	. . . .	. 6m/w $50k .	. X(a) . . .
. . . .	6m/w X . .	. . .	. . . .	. X 6m/w $50k
. .	. .	6m/w .	. $50k	. .
6 m/w -------	6 m/w -------	6 m/w -------	6 m/w $ 100k	6 m/w $ 50k
2m/w	2m/w	2m/w	2 m/w	2m/w

JPN - Japanese funded activity
(a) - Japanese funded with Australian contribution in 1996 and 1997.

Table 3

4. REGULATIONS

Objective:
To assist Member states in understanding and comment in implementation of recommendations of ICRP 60 in the region.

Output 1:
Regionally harmonized guidelines for implementation of the ICRP 60 recommendations.

Activity for Output 1
1.1 Regional expert meeting to review the situation and to prepare draft guidelines.
1.2 Set up national networks incorporating all relevant agencies involved in radiation protection and major organizations affected by the ICRP 60 recommendations.
1.3 National seminars to inform on the consequences of the introduction of the ICRP 60 recommendations and their implementation on a national and regional basis.
1.4 Regional Training on implementation of ICRP 60 regulations. (Full scope of the scheduling needs over the next five years to be reassessed at the next EAGM)

	1993	1994	1995	1996	1997
	.	.	.	AUL	.
	.	X			X
	.	.	.	8m/w	8m/w
	$50K	.	.	.	.
Sub-total: Experts	-----	-----	-----	8m/w	8/w
T/C	$50k	-----	-----	-----	-----
Grand Total: Experts	20m/w	25m/w	24m/w	33m/w	16m/w
T/C	$50k	$50k	-----	$100k	$50k
Fellowships	-----	-----	26m/w	26m/w	26m/w

AUL - Australian funded activity

Prospectus

Title: REGIONAL (RCA) WORKSHOP ON THE APPLICATION OF THE ICRP'S 1990 RECOMMENDATIONS FOR RADIATION PROTECTION

Place: Nuclear Energy Unit, Kuala Lumpur, Malaysia

Date: 16 - 27 August 1993

Deadline for nominations: 15 June 1993

Organizers: The International Atomic Energy Agency in co-operation with the Government of Malaysia through the Nuclear Energy Unit

Language: English

Participation The workshop is open to 15 participants from developing RCA Member States in the Asia and Pacific region.

Purpose of the workshop: The purpose of the workshop is:

- to familiarize the participants with the latest developments in radiation safety principles and concepts, and with the basic regulatory requirements that derive therefrom
- to examine the application of the basic requirements, taking into account the prevailing circumstances in the countries of the workshop participants.

Nature of the workshop: The workshop will include a mixture of lectures and group discussions, and interactive participation will be encouraged so that all participants may benefit from the collective experience and knowledge of the group. The subject matter will cover four broad areas:

- The need for international consensus on radiation safety standards and the development of new Basic Safety Standards for Radiation Protection (International Standards for Protection Against Ionizing Radiation and for the Safety of radiation Sources, April, 1993, by WHO, ILO, FAO, PAHO, NEA/OECD and IAEA.

  .. basic requirements for controlling occupational, medical and public exposures
  .. improving the safety of radiation sources by restricting the probability and consequences of the "potential exposures" which could occur following events such as accidents, errors or equipment failures
  .. control of occupational exposures to naturally occurring sources of radiation
  .. optimization of protection and safety measures, including the application of dose and risk constraints.

.. criteria for intervention, and the justification and optimization of the measures for intervention after accidents, intervention to reduce doses from sources of radiation that exist due to previous practices or accidents, and intervention to reduce undesirably high radiation such as radon in homes.

- National infrastructures including legislation, regulatory authorities, regulations and radiation safety services.

- Application of the ICRP recommendations and their incorporation into national regulations and practices, with emphasis on their application in the countries of the workshop participants.

Participants' qualifications: Candidates should have several years of radiation protection experience. Priority will be given to senior radiation protection specialists and authorities from national organizations involved in developing policy, standards, regulations or infrastructures for radiation safety.

Each participant will be expected to report on the state of radiation protection in his/her country, including an outline of any problems in applying the ICRP recommendations.

Application procedure: Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 15 June 1993. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered. Completed and endorsed application forms may be submitted by facsimile.

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

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

Administrative and financial arrangements:

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

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

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

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Project Title and Number: COORDINATED RESEARCH PROGRAMME ON THE COMPILATION OF ANATOMICAL, PHYSIOLOGICAL AND METABOLIC CHARACTERISTICS OF A REFERENCE ASIAN MAN

Project Description: The Coordinated Research Programme was established to acquire data on the Asian population that will be used for radiation protection purposes, with an emphasis on internal dosimetry. Current international guidelines are based on data that is primarily representative of Caucasian populations. The CRP is intended to identify population characteristics that may be sufficiently different from ICRP Reference Man values to justify scaling or modification of radiation protection guidance to match regional or national conditions.

Participating Member States: Bangladesh, China, India, Indonesia, Japan, Korea*, Malaysia*, Pakistan, Philippines and Vietnam.

* Participating only through 1991

Project Officer: R. Griffith

Major Activities in 1993

1. Submission of country reports with compiled data sets.

2. Research Coordination Meeting, Tianjin, China, 25-29 October, 1993.

Time-table for Planned Activities in 1994

1. Publication of TECDOC to summarize results of the CRP.

2. Presentation on the CRP by the Project Officer at the Annual Health Physics Meeting, San Francisco, California, 27-30 June, 1994.

3. Project Formulation Meeting on possible extension of the CRP work, Japan, November, 1994.

Annex 23

AUSTRALIAN COUNTRY STATEMENT

16TH WORKING GROUP MEETING
BALI, INDONESIA, 22-25 MARCH 1994

The Australian delegation is most appreciative of the detailed arrangements made by the Indonesian Government for the 16th RCA Working Group Meeting.

It is a pleasure to see the membership of the RCA continuing to increase and accordingly we welcome Burma. It is anticipated that New Zealand will shortly join the RCA and we look forward to this event occurring.

The activities of the RCA continue to provide a range of benefits to its Member States. It is clear that the peaceful applications of nuclear science and technology under these RCA activities have assisted development in the region. They have been effective in many ways such as the development of human resources, and the development and support of appropriate infrastructures. This is achieved through activities such as training courses, workshops and seminars, both on a regional and national basis, and is supported further by fellowship training, provision of expert services and supply of equipment. However it is most important that this development is sustained through the targeting of end-users and this aspect must be carefully considered, both in the design and implementation of projects. It is equally important that countries, when proposing candidates for training, take into consideration the need to maintain continuity of the expertise attained so that the foregoing goals can be achieved.

Activities under the Joint UNDP/RCA/IAEA programme have progressed satisfactorily in the past year and those under the Australian funded programme are currently increasing in momentum following the commencement of projects during 1993.

Australian Projects

Australia has provided funds for activities which are organized under the umbrella of the joint UNDP/RCA/IAEA project on applications of isotope and radiation technology to regional development with special reference to industry and nuclear medicine. The Australian supported project has been specifically designed to meet IAEA and UNDP requirements and has close linkages to the activities and outputs of several parts of the UNDP project. Activities commenced in 1993 and will continue to 1995 with total funding of A$1,500,000.

Industrial Applications of Isotope and Radiation Technology

This sub-project has been designed to achieve technology transfer through a process in which graduates from a series of regional training courses will augment the existing RCA structure to form a network providing a basis for a series of national seminars. Training courses have already been held in radiation technology and industrial isotope applications with a materials science training course now scheduled for 1995. A programme of national seminars commences shortly and will continue on a regular basis until the end of 1995. The topics covered in the national seminars have been defined by consultation with national co-ordinators and thus cover a range of subjects such as application of nuclear techniques to process optimization in the chemical and refining industries, application of nuclear techniques to the metals and manufacturing industries and application of nuclear techniques to coastal engineering reflecting the various developmental needs of individual Member States.

Industrial Radiation Protection

Through the application of distance learning techniques this sub-project seeks to provide countries with the support necessary for the development of basic minimum radiation standards and practices as well as the infrastructure for the implementation of these standards and practices. The first stage involves the development and distribution of high quality training manuals for use in the region by both industrial users and regulators. Some 15 basic modules on radiation protection are being developed with an additional small group of modules for regulators. Each module will include self assessed tests at appropriate points to ensure that part of the module is understood before the student progresses to further parts. Following the introduction and trial of the developed materials at a regional training course a series of regional seminars and practical workshops are planned.

Nuclear Medicine

The objective of this sub-project is the development of a programme of distance education for nuclear medicine technologists who do not have specialist training in the nuclear medicine field. This programme will provide for the achievement of a higher standard and uniformity of education in nuclear medicine technology. The materials being developed will be suitable for use at an individual level or they may be integrated into existing courses of training. Before

finalization of the material it will be used in a pilot scheme. The current timetable envisages the holding of a Course Advisory Board Meeting in July 1994 followed by a workshop for country co-ordinators in November. Material for the pilot course will be assessed during 1994.

Following successful completion of the project, it could be expected that the nuclear medicine community within the RCA member countries would have acquired a level of self sufficiency with the training materials and methods provided during the project to be able to provide a continuing training programme.

9th Pacific Basin Nuclear Conference

The 9th Pacific Basin Nuclear Conference will be held in Sydney on 1-6 May 1994 hosted by the Australian Nuclear Association and sponsored by the Institution of Engineers, Australia under the auspices of the American Nuclear Society. The theme of the conference is Nuclear Energy, Science and Technology - Partnership Pacific. Many aspects of nuclear energy, science and technology will be addressed including: international and regional co-operation; education and training in nuclear science and technology; public acceptance; nuclear power - the next twenty years; nuclear fuel resources and fuel cycle; radioactive waste management; nuclear and radiation safety; research reactors and the application of nuclear and isotopic techniques.

Some 170 technical papers have been accepted for the conference. I know that a number of participants at this RCA meeting will be attending and presenting papers at the conference and even at this late stage I would like to invite others to attend this important conference.

A programme of technical visits has been arranged and includes ANSTO, the National Medical Cyclotron, a gamma irradiation facility and uranium mining operations.

Additional Activities

A number of RCA activities will also take place around the time of the Pacific Basin Nuclear Conference: ANSTO is the host institute for the Regional Workshop on Research Reactor Utilization on 25 April to 13 May. The workshop will emphasize neutron beam utilization with covering aspects such as small angle neutron scattering and neutron radiography. Hands-on experience will be provided utilizing research facilities at ANSTO. Other aspects including neutron activation

analysis and radioisotope production will be addressed. The UNDP/RCA/IAEA National Counterparts Meeting will be held on 28-29 April in Sydney followed by the Tripartite Review Meeting on 3 May 1994 and a panel session of 9PBNC on the role of science and technology in development. Participants in all these meetings are encouraged to take Part in the full range of activities of the 9th Pacific Basin Nuclear Conference. In addition an Australian funded IAEA Regional Training Course on National Safeguards Systems will also be held in Sydney on 9-20 May 1994.

Non-Destructive Testing: On 17-20 January 1994 the Australian Institute for Non-Destructive Testing (NDT) hosted a programme on proficiency testing in Non-Destructive Testing under the Japanese funded project. A total of 14 participants were assessed at various levels in radiographic and ultrasonic testing levels by four Japanese experts. In addition a Proficiency Testing Programme Review Meeting was held with representatives from Indonesia, Malaysia, Korea, Japan and Singapore to review all the testing results. ANSTO continues to provide IAEA fellowship training in NDT.

Nuclear Medicine: It is anticipated that a fourth regional training course on the use of computers in nuclear medicine will be conducted in late 1994. This follows the three previous successful courses held at the Royal Prince Alfred Hospital in 1989, 1990 and 1992.

Technical Co operation Policy Review Seminar

Australia welcomes the decision by the IAEA Board of Governors to hold a Technical Cooperation (TC) Policy Review Seminar in September this year. The Seminar will promote the continued responsiveness of the TC programmes to the needs of recipient countries, thereby enhancing the TC programmes capacity to compete for limited development co-operation funds. It will also provide an excellent opportunity to demonstrate the value regional arrangements such as the RCA can have in meeting calls for tangible end-user impacts in TC projects. Australia looks forward to working with RCA Member States to contribute to the Seminar process.

Conclusions

There is ample evidence that the joint UNDP/RCA/IAEA programme of activities has achieved success in the transfer of nuclear technology in a range of disciplines throughout the region. Such success is most dependant on proper planning, development of human resources and support for appropriate infrastructure development. However it is activities such as training courses, workshops, seminars, fellowship training, provision of expert services and the supply of equipment which contribute to the capacity and capability of the individual Member States to use and develop nuclear technology for peaceful applications. The ability to sustain development at the national level in the industrial and medical applications of nuclear science and technology is now being realized in Member States under the joint UNDP/RCA/IAEA.

Australia believes that the technical co-operation and national and regional knowledge and infrastructure developed as a result of its involvement in the RCA are greatly beneficial for the peace and prosperity of all. Australia looks forward to continued participation in RCA activities. This, together with the strong commitment of all RCA Member States will ensure further successful achievement of the goals of regional co-operation.

Country Statement - Bangladesh

Sixteenth RCA Working Group Meeting

22 - 25 March, 1994
BALI, Indonesia

It is my great pleasure to participate as a delegate from Bangladesh in this sixteenth RCA Working Group Meeting in Bali one of the many beautiful places in the host country, Indonesia.

Bangladesh has been actively associated with RCA since its inception and has been participating in almost all activities of this august body. Bangladesh has been greatly benefitted by various activities of the RCA to enhence national efforts in the field of nuclear science and technology.

A brief description of activities in various projects in Bangladesh during the 1993 are given below:

1. UNDP/IAEA Industrial Project:

Bangladesh has been participating in all components of this project, although the activities in respect of tracer technology and radiation processing are still in the initial research and development stage.

(a) Non-destructive Testing: The activities are mainly directed towards the development and implementation of technology in industrial sector in the following fields:

i) To fullfill the demands of the NDT services in the industrial sector for quality control and quality assurance—leading industries like thermal power station, fertilizer factories

gas transmission system, ship-building, aircrafts, oil refinery, railways, etc. have received services from NDT group during this period.

ii) To develop human resources for having a strong and effective local practitioners in the country through training in which the national NDT training and certification committees have been engaged since the beginning. A good number of personnel at all levels of techniques have been trained up. During the last one year following activities were done:

- A two-day seminar on senior level executive where 30 participants from leading industries attended.
- A one-day national seminar on NDT with 100 participants.
- NDT appreciation course for industrial workers.
- Radiographic testing levels I & II.
- Postgraduate academic thesis works for postgraduate students.

iii) Harmonization of NDT training and certification schemes with the regional schemes is being planned.

The future activities in NDT is directed to expand and collaborate applications to more installations and industries. This will reduce the dependanceness on foreign NDT personnel. More people will be trained in the NDT technology of level 2 & 3 to render services to national industries and arrangements are in the way for conduction examinations for levels I, II & III in accordance with ISO DIST 9712 guideline.

At present there are 250 certified personnels in the various aspects of NDT specialties.

(b) <u>Radiation Processing</u>: In this field, scientists are engaged in wood plastic surface coating using UV techniques. Research and development activities on wood plastic composite surface coating curing and radiation vulcanization of natural rubber latex have been successful and a pilot plant is being planned

with the aim to go into small scale commercialization in future.

A national seminar on Radiation Curing of Surface Coating is being organized in May/June this year and a national training course is scheduled to be held on UV Radiation Curing in 1995.

(c) Nuclear Analytical Techniques: Following techniques are used for analysis in Bangladesh:

i) Particle induced X-ray emission (PIXE)
ii) X-ray fluorescence
iii) Proton induced gamma ray emission
(iv) Atomic absorption spectrophotometry
v) Gas chromatography.

With these techniques presence of trace elements in biomedical and industrial samples are being analysed. These services are being offered routinely to the Institute of Postgraduate Medicine and Research and to several industries for determination of trace elements contamination. These analytical techniques are being used more and more in bio-medical investigation in metabolic diseases related to alteration of trace elements and deficiency diseases.

(d) Application of radioisotopes tracer technology in industry: Applications of tracer technology is still in the early state in Bangladesh. There were demonstrations of this technology in mercury inventory in electrolytic cells and gas flow calibration in National Gas Transmission and Distribution System.

It is planned to be used in fertilizer factory and thermal power station based on natural gas.

2. Research Reactor Utilization:

The project has been initiated to organize research and development on neutron beam and neutron activation analysis. Neutron beam

research is based on triple axis spectrometer for material studies via neutron scattering.
A triple axis neutron spectrometer (TAS) has been installed in piercing beam port of TRIGA Mark II Research Reactor. Neutron radiography set up has been installed in tangential beam port of the research reactor. Research works are being carried out successfully to study absorption of water in building materials and to study the quality of several types of leather, rubber and plastics.

A basic laboratory for neutron activation analysis have been developed which include S-100 mCA master board packages and PC based PHGe detector. Irradiation of rock and soil samples are used for analysing of rare earth elements.

3. Medical and Biological Applications of Nuclear Techniques:

a) Radioimmunoassay (RIA) of Thyroid Related Hormones: Through the participation in this project 10 laboratories for RIA have been developed. Bangladesh has also been participating in External Quality Assurance Programmes (EQAS) with Pakistan, Singapore and Indonesia. This has been useful in improving the quality of RIA in this country. In addition to EQAS, interlaboratory quality control programmes have recently been started in the country.

(b) RIA for Hepatitis B Diagnosis: Bangladesh is participating in this RCA project for diagnosis of viral hepatitis with RIA. Kits and equipment are being received from China through the assistance for IAEA. Five laboratories in the country have been participating in this project.

At present target groups, namely medical workers, pregnant mothers, neonates and blood donors are being screened for hepatitis. Viral hepatitis being a major health problem in Bangladesh like many

other countries in this region, the participation in this project is going to be very useful.
One scientists attended training course in Beijing, China held in April/May, 1993 on "preparation of basic reagents for RIA of viral hepatitis". One scientist received training for 4 months in Bangkok in RIA techniques which will help us to use bulk reagents reducing cost of assay. At the sametime arrangements have been made for immunization of HBsAg negative babies.

(c) Bangladesh participated in the project, Diagnosis of liver diseases (Phase II) which has been completed with final RCM in Delhi in January, 1993.

(d) Bangladesh also participated in the project, Radioaerosol permeability studies with BARC Nebulizer which has been successfully completed with the final RCM held in December, 1993 in Bombay.

e) Strengthening of Nuclear Medicine: Bangladesh has full support for the ensuing project of Strengthening of Nuclear Medicine in RCA countries. At present there are orientation and short training courses on operation and instrumentation for technicians working in nuclear medicine institute and centres. It is expected that this project will be helpful for Bangladesh to develop adequately trained personnels. It may be mentioned here that a one year Diploma Course under Dhaka University have been started in the Institute of Nuclear Medicine since 1988 and so far 31 physicians successfully completed the course.

f) Radiation Sterilization of Tissue Grafts: Both scientists and clinicians have been engaged in this project. In radiation sterilization of tissue graft project sterilized amniotic membrane for dressing burn wound and bone pieces for use in orthopaedic and dental surgery are being produced. These

materials are used in limited quantity at present. However, demands for this material are increasing gradually.

g) Bangladesh is also expected to participate in two other projects, namely improvement of cancer therapy and use of radioiodine in management of thyrotoxicosis.

h) **Maintenance of Nuclear Medicine Instruments**: Bangladesh would welcome the idea of having second hand scintillation cameras which have been refurbished and upgraded. One of our scientists participated in the workshop on Trouble Shooting in Gamma Cameras in BARC, India. Bangladesh hosted the Regional Planning Meeting in Quality Assurance in Nuclear Medicine in Dhaka, 28 November to 02 December, 93.
Scientists in this field have been working in upgrading and improvement of quality of images in several old gamma cameras in the country in addition to routine repair and maintenance works.

4. Maintenance of Nuclear Instruments (non-medical):

Scientists and engineers are working in the following lines:

1. development of general purpose microcontroller
2. development of samples changer and
3. development of temperature controller

This group is responsible for upgrading and maintenance of equipment in Atomic Energy Centre, Dhaka and Atomic Energy Research Complex, Savar. This group are also rendering services to Universities and several private laboratories. Scientists and engineer attendant workshop and training courses held during 1993.

5. Energy Study and Nuclear Power Planning:

Being deficient in natural sources, Bangladesh is a suitable country for nuclear power plant and there is a commitment by the Government. However, this has not yet been possible for various reasons including the lack of a donor country. Scientists of BAEC have been studying the issues relating to long term energy development in Bangladesh. RCA programme in energy and power planning include the use of MAED, WASP and ENPEP methodology. Bangladesh has been gaining experience and being benefitted on long term power development planning.

One scientist participated in Project Formulation Meeting in Jakarta in July 1993.

More IAEA/RCA input is required for implementing programmes on trading on MEAD/WASP.

6. Improvement of Grain-Legume Rhizobium Symbiosis to Fix Atomsphering Nitrogen:

Bangladesh has been actively participating in this project and the on-going works are isolation of rhizobium strain from grain legumes grown on acid soils, green house experiments on symbiotic interaction and lime piloting experiments. 1.5 ton of rhizobial inoculant has been produced and distributed to the different organization for field application. In recent future studies on legumes to inoculate at different agroecological regions of the country are planned.

7. Food Irradiation Processing:

Present activities are mainly directed to market survey and acceptance of irradiated food stuff like onion, potatoes, spices and grains. These food stuff were approved by the Government.

The commercial irradiator Gammatech Ltd. has been installed and has been functioning since APRIL 1993.

8. Strengthening of Radiation Protection Infrastructure:

Since the passing of the Bill for Radiation Control and Protection, Scientists are working for implementation of various action programmes. An expert from IAEA came to Bangladesh for helping in this matter. The secondary standization of radiation dose and calibration equipment has been working satisfactorily and these are being used for calibration of x-ray equipment in the country. A programme has been developed for comprehensive personal monitoring services. An inventory is under preparation to list the radiation sources and construction of central radioactive waste storage facility are in the planning stage.

Conclusion:

In conclusion, Bangladesh wishes to express its satisfaction with the implementation of various RCA activities and has great desire to further promote regional cooperation in peaceful uses of nuclear science. On behalf of Bangladesh, I would like to thank the Government of the People Republic of Indonesia for hosting 16th RCA Working Group Meeting. We look forward to continue cooperation under RCA.

Country Statement-The People's Republic of China for The 16th RCA Working Group Meeting Bali, Indonesia 22-25 Mach 1994

Zhu Jiang

China Atomic Energy Authority (CAEA)

Mr. Chairman, Distinguished delegates, Ladies and Gentlemen:

It is my great pleasure to participate the 16th RCA Working Group Meeting here in Bali, Indonesia, and I would first like to congratulate you on your election as Chairman of this 16th RCA Working Group Meeting. I am confident that under your guidance, the meeting will successfully achieve fruitful results.

As a member state, the People's Republic of China has been involved in RCA activities since 1985, and has greatly benefited from them. We have also made our efforts to contribute to the region. In 1994, China will continue to commit US$ 50,000 in financing two regional workshops to be held in China.

Chinese delegation would also like to take this opportunity to congratulate the IAEA in its effort, for having succeeded in convincing the UNDP to financially support the new UNDP/RCA project entitled 'The use of Isotope and Radiation to Strengthen Technology and Support Environmentally Sustainable Development' or shortly 'the Environment Project'.

Now, I would like to take this opportunity to brief you on the summary of activities carried out during 1993 in relation to RCA program.

UNDP Environmentally Sound Technologies Project

1. Tracer application in industry

An IAEA expert mission to Nanjing and Shanghai was undertaken by Dr. P.Airey and Mr. A. Davision from 23 to 30 Oct. 1993. A seminar on the

applications of radiotracer techniques to the investigation of off-shore sediment transport process was also held at Nanjing. The mission has discussed with Chinese counterpart on the tracer investigations supporting the proposed Shanghai and Hangzhou Bay port development projects.

The experts endorse the conclusions concerning the potential importance of RI tracing techniques in understanding key processes essential to the design of optimum dredging strategies.

Radiotracing technique application in hydrology and sedimentology is very important field for us,

At the Institute of Atomic Energy, Beijing, the study on oil field well tracing (I-125, Co-60, Cr-51) is in progress.

2. Nucleonic Control System (NCS) application

In 1994, A National Seminar on NCS application in paper industry will be held in Beijing.

It is proposed that the Regional Workshop on NCS in small and medium sized paper industry will be held in Shanghai and Beijing in 1995. The Shanghai Institute of Process Automation Instrumentation (SIPAI) and the Beijing NO.1. Paper Mill will be the host institutions.

In Baoshan Iron and Steel Group Co., a activity on NCS-Steel Industry is considered.

The International Conference on Isotopes will be held in Beijing from May 7-12, 1995. this is sponsored by Chinese Nuclear Society and Isotope Society of China. the tentative scopes of the conference includes Isotope tracer application, NCS, radiation Processing, Nuclear Analytical Techniques. Stable Isotope, Radioisotopes and its products Development and preparation, and others, It is my great honour to invite all of you to attend this International Conference.

3. Non-Destructive Testing

The NDT technique has now become a very basic inspection tool of industries in China and were got widely applications in different fields, A network on NDT R & D has been developed in China.

The 2nd National Seminar on Nondestructive Testing and Evaluation for Nuclear Materials and Fuel Elements will be held from 15-19 Nov. 1994, in

Chengdu. The Nuclear Power Institute of China (NPIC) will be the host institution. The seminar will evaluate the training programs and textbooks for materials and fuel elements NDE personnel, and discuss the development in future, and Review the application of computer in nuclear industry NDT.

4. Radiation Processing

Radiation Cross linking

A Regional Workshop on Radiation Processing- the Economic Benefits' was held in Beijing from 11-15 Oct. 1993. 4 experts and more than ten foreign participants attended. Capital investment and operation cost, economic benefits and social effect of radiation cross linking, curing, sterilization and food irradiation preservation are reviewed. Transfer of technology and related problems are discussed.

The National Workshop on Radiation Cross linking of wire, cable and shrinkable materials will be held in shanghai from 25-29 April 1994. Shanghai University of Science and Technology will be the host institution..

In recent year, the annual output of radiation cross linking products achieved more than 100 million Chinese Yuan RMB. radiation crosslinked wire, cable and shrinkable materials have been applied in many sectors of the national industries.

Radiation Curing

A National Workshop on Radiation curing will be held in Beijing from 9-12 May 1994. The Radiation Curing Committee of China Isotope and Radiation Association will be the host institution. The world status of EB & UV curing application in Wood, paper, plastic, metal and in coating, printing, package and other industries will be discussed.

The Radtech-Asia will be held in Shenzhen, China 10-12 Dec 1995 and in Thailand 14 -16 Dec. 1995. We hope, through this activity, the R & D, the commercialization of Radcuring technique will be extensively promoted.

Radiation sterilization

According to the report of IAEA, about 80% of the commercial gamma facilities in the world was used for radiation sterilization of disposable medical products. The quantity of radiation sterilization of medical products had been reached to 35-50% of total quantity of sterilization on medical products and has the potential to rise. In China, there are more than 40 gamma facilities with the design capacity above of 3.7×10^{15}Bq(100KCi), Almost all the facilities are multipurpose, Radiation sterilization of medical supplies is one of the main application field.

Now, the national technical regulations for radiation sterilization have been laid out and come into effect and quality control standards are been formulated.

The Regional Training Course on open learning techniques applied to radiation sterilization of tissue graft will be held in Suzhou from 13-24 June, 1994. Suzhou Medical College will be the host. The training course will focus on the areas of management, procurement, building and design, processing, sterilization and utilization.

In connection with the RTC, The 5th Meeting of the Asia-Pacific Association of Surgical Tissue Banking (APASTB) also will be held in Suzhou, from 15-17 June 1994.

The Regional Seminar on Radiation Technology for biomedical Application will be held in Shanghai 12-16 Dec. 1994. Shanghai University of Science and Technology will be the host institution.

It is proposed that a Regional Training Course on Radiation Sterilization will be held in Beijing in 1995.

Radiation Vulcanization of Natural Rubber Latex

Zhuzhou Rubber Latex Institute and Suzhou Medical College are participating institutions of this RVNRL sub project. One fellow from Suzhou Medical College studies at Takasaki RCRE under STA bilateral program.

Radiation Processing for Environment

Electron Beam processing of flue gas for So2 and Nox removal and Radiation Treatment of sewage and sludge are very important projects for environment conservation.

The National Workshop on Environmental application of radiation technology was held in Shanghai from 7-9 Dec. 1993. Shanghai Institute of Nuclear Research (SINR) and Baoshan Iron & Steel Group Co. were the host institutions, IAEA sent Poland and Japan experts to the workshop. The recent pilot plant results in Poland and Japan show very promised future. Now, in China, China Institute of Atomic Energy, Qinghua University, Shanghai Institute of Nuclear Research, China Institute of Radiation Protection, Foshan, Shenyang and Chongqing cities are in the position of actively consideration. The key factor for this project is economic feasibility analysis.

It is proposed that a National Seminar on radiation treatment of municipal wastes (sewage and sludge, flue gas) will be held in Beijing or Shanghai in 1995.

Following titles are interested for us:

Beam (both ion beam and electron beam) application, biotechnology application, New functional materials, environment-friends materials and many others.

5. Nuclear Analytical Technique

Nuclear analytical techniques are very important technique for environment, industry, health, agriculture and archaeology. Environment pollution analysis, particularly the airborne particulate matter analysis are very important.

The 16th International Conference of Nuclear Tracks in Solids was held in Beijing, September 1992.

The 6th National Conference on Activation Analysis was held in Shenzhen, November 1993.

The Regional Workshop on Nuclear Technique in Material science was held in Beijing, September 1993.

Food Irradiation

Food Irradiation in China has now reached a stage of Commercialization following the development over more than 30 years. In a past decade, a total of 70,000 tons of foods, or less than one-thousandth of the nation's overall output of foods, were irradiated in China. In recent years, marketing tests have been carried out in Chengdu, Shanghai, Nanjing, Zhengzhou and Beijing, The results indicated that about 2/3 of the consumers surveyed were willing to buy irradiated foods. The main reason that irradiated foods are purchased by consumers is the fact that the quality of irradiated foods is better than that of non irradiated ones.

A Regional Workshop on Food Irradiation was held in Shanghai September 1993. Shanghai Radiation Center was the host.

A Regional Workshop on Food Irradiation Commercialization and Marketing Test will be held in Beijing October 1994. The Institute of Atomic Energy Application/Chinese Academy of Agricultural Science (IAAE/CAAS) will be the host institution.

Agriculture

Nuclear techniques applied in Chinese Agriculture are popularized. We hope more communications among the regional countries in following fields:

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

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

Sterile insect technique (SIT) application.
Isotope tracer applied to insecticide residues, environmental protection and fertilizers application study.
Radio immunoassay for animal disease and health.
Food Irradiation Preservation.

We strongly support the agricultural proposals submitted by IAEA/RCA: Nitrogen fixation, Induced Mutation, biotechnology, SIT, Public information and trade developments in irradiated Foods,

Nuclear Medicine

In 1993, the Nuclear Medicine status in China was investigated by Chinese Society of Nuclear Medicine, some results as follows: Total staff 4002. Gamma Camera 75 sets, SPECT 102 sets, Data processing System 433, Gamma Counter 847, Liquid Scintillation Counter 168, Thyroid uptake 421, Renogram 388, Scanner 315. medical use RI: Tc-99m 1848Ci, I-131 511.6Ci.I-125 77Ci, and others.

The Regional Training Course on the preparation of basic reagents for the RIA of Hepatitis B Markers was held in Beijing from 26April-7May 1993. China Institute of Atomic Energy was the host institution. 18 participants and 3 lecturers attained.

We support and would like to participate all the following activities: Radiation Sterilization for tissue Grafts, Nuclear Instrument Maintenance, Radioaerosol inhalation imaging, Diagnosis of liver diseases, Radiotherapy of Carcinoma of the Cervix, I-131 treatment for hyperthyroidism. Open and Distance Learning for Nuclear Medicine and others.

Radiation Protection

The Expert Advisory Group Meeting on RCA Project Radiation Protection Infrastructure was held in Beijing March, 1993. The priorities, objectives, outputs activities and milestones of the program were discussed. Off-site emergency, external and internal dosimetry, Reference Asian Man and many others were in the high priority position.

The Regional workshop on Radon Monitoring was held in Hengyang, 11-19 October 1993. The Hengyang Institute of Technology was the host. The participants were very impressed by the high Chinese standards for radon studies and the radon chamber.

The Final Research Coordination Meeting for CRP on Reference Asian Man was held in Tianjin, 25-29 October 1993.

The Regional Workshop on External Dose Assessment Techniques will be held in Taiyuan, China from 19-26 July 1994. The Training Center of Radiation Protection and Nuclear Safety, China Institute for Radiation Protection (CIRP) will be the host.

Research Reactor and Energy Planning

China support research reactor and energy planning related projects, The Miniature Neutron Source Reactor, Neutron Transmutation Doping Technology of Silicon, Material Characterisation and some other activities have been held at China Institute of Atomic Energy. We support the neutron scattering project.

Now in China we have two nuclear power plants in operation: Qinshan (commercial) and Daya Bay (connect to grid). more NPP is needed both in China and other RCA countries. China is wishing to host a regional training course on safety and reliability improvement through optimized maintenance of NPPs in 1994 or 1995.

The Advisory Group Meeting on the Review of Design and Safety Approaches for Heating Reactors will be held in Beijing from 6-10 June 1994. The Institute of Nuclear Energy Technology of Tsing hua University will be the host institution.

Finally, I would like to join other delegates to express our thanks to the Government of the Indonesia, BADAN TENAGA ATOM NASIONAL (BATAN) for hosting this important 16th RCA Working Group Meeting and for the warm hospitality extended to us during our stay in Bali, Indonesia, the beautiful Island.

Thank you.

16th RCA Working Group Meeting of RCA Member States

Bali, Indonesia, March 22-25, 1994

Country Statement - India

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

1. INTRODUCTION

At the outset, I would like to express our heartfelt thanks to the Government of Indonesia for hosting this meeting in the picturesque Bali islands and for the kind hospitality extended to the delegates. India has had a very long association with the scientists of the National Atomic Energy Agency of Indoneisa. I take this opportunity to convey the greetings of many scientisits from India who have interacted with the scientists from the host country at various forums in the past.

Regional Cooperation Agreement (RCA) has been a binding force for the scientists of the Asia & Pacific region for working on scientific and technical problems of common interest to the region. The successive extensions of the Agreement, the increase in the number of participating countries and the widening scope of co-operative projects, is a clear proof of the importance which participating countries attach to this programme and its beneficial results. Besides being a founder member of RCA, India has always been in the forefront of the various scientific activities conducted under the RCA and has provided support both in cash & in kind, to various RCA authorities. India has shared its facilities and expertise with other scientists of the region, and will continue to do so in the future also.

Apart from the generation of electricity, the applications of radioisotopes & nuclear techniques in medicine, industry & agriculture is the other main objective of India's nuclear energy programme. Over the past 3 decades, radioisotopes & radiation techniques have been successfully applied in these fields for solving problems of national development. We are committed to the use of nuclear techniques in these spheres, particularly since these techniques are of immediate relevance to our situation. This report summarisies briefly the work carried out in India in different RCA projects as also the UNDP funded Industrial Project.

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* Mr.R.G. Deshpande unfortunately expired after preparing this paper.

Presented by Dr. B.A. Dasannacharya

2. MEDICAL & BIOLOGICAL APPLICATIONS

India hosted the final RCM of the Project on Radioaerosol Inhalation Imaging for Diagnosis of Respiratory Diseases in Developing countries at the Radiation Medicine Centre, Bombay during December 1993. The investigators in this project utilised the radioaerosol generator system developed & supplied by BARC for clinical use as also for studying the effect of environmental pollution. These studies have provided very significant results which can have great bearing on matters of public health and environment. This technique has provided for the first time a quantitative method of testing effect of environmental pollution on human physiology by studying half-clearance time of inhaled Tc-99m DTPA from lungs of normal, healthy non-smoking adults using gamma camera system. Although the data obtained so far is small, the trends are very significant. India strongly supports the Agency's proposal for financial support for holding a RCM in 1995 to consolidate the results of research on air pollution & lung function being carried out in 10 RCA member states. India also supports the project on the standardization of iodine-131 treatment for hyperthyroidism as this will help in gathering information regarding the dose required for treatment of thyrotoxicosis in various ethnic Asian groups vis-a-vis the European population. Also a study of this kind can help in obtaining data in this region for reference, as at present all comparisons are made from data reported in western region.

India has actively participated in the project on Maintenance of Nuclear Instruments and hosted a 4 week Regional Workshop on Trouble Shooting and Repair of Gamma Cameras during August-Sept. 1993, as also the Working Group Meeting on Proper Selection of Protective Devices for Nuclear Instruments during March-April 1993. The Regional Workshop included 33 lectures, 9 demonstration and 11 practicals and a few field visits. The workshop was appreciated by the participants from RCA countries, who suggested holding in the future an advanced course on SPECT system including quality control & trouble shooting. Computer Management Quality Assurance (CMQA) software package is being developed to assist nuclear medicine centres to effectively carry out inventory, preventive maintenance and quality control of nuclear medicine instruments.

In the CRP on Clinical Trial for Carcinoma of the Uterine Cervix, the work carried out in India at the Tata Memorial Centre is aimed at optimization of accurate treatment planning for improved local control & cure rates. The project group in India has made some suggestions for improvement of IAEA supplied software and the project will be reviewed at final RCM to be held in Seoul, Korea from March 28, 1994. In the project on Radical Irradiation for Conservative Management of Early Breast Cancer, the survival rates, recurrence pattern and cosmetic outcome will be studied in early breast cancer treated with conservative management. India is also participating in the Project on Radioimmunoassay for Hepatitis B Diagnosis (Phase II), wherein some of the parameters are being re-optimized using reagents supplied by China for obtaining satisfactory results.

3. FOOD & AGRICULTURE PROJECTS

India actively participated in the Regional UNDP project on Food Irradiation Process Control & Acceptance. In the intra country transportation and overseas shipping trials conducted the quality of the irradiated products at the destination after trans-shipment & storage was evaluated and found to be satisfactory. Studies were also carried out on the efficacy of gamma irradiation, vapor heat treatment and refrigeration on quarantine treatment of mango fruits. The studies provided mixed results and it was concluded that for optimum results, the fruits need to be irradiated at the hard, green, unripe stage, soon after the harvest when the population of adult seed weevil is low. India supports the new project proposal on Public Acceptance and Trade Developments in Irradiated Food in Asia and the Pacific, and is keen to participate in the project. India will host the final RCM of the project on Use of Isotopes in Studies to Improve Yield and Nitrogen Fixation of Grain Legumes, at the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) at Hyderabad during August-September 1994.

4. RADIATION PROTECTION INFRASTRUCTURE PROJECTS

India actively participated in the Project on Reference Asian Man Under which the relevant anatomical & physiological data of average Indian man was collected. Anatomical data on the weights of the body organs were collected from 24 medical institutions located in 18 cities and in all 14,500 post-mortem cases of accidental death were critically examined to determine the average organ weights representative of adult male and female population. The data on average daily consumption of principal nutrients was obtained from national surveys & data on average daily intake of a number of trace elements was obtained using Atomic Absorption Spectrometry & Neutron Activation Analysis. Based on the data collected, it is concluded that the proposed weights of 52.5 & 45 kg for Reference Indian male and female respectively are significantly lower than those of ICRP reference male and female (70 & 58 kg respectively). Likewise the height, sitting height, body surface area, chest-circumference etc. are smaller for Indians as compared to ICRP reference for male & female. These are also significant differences in physiological parameters and daily dietary consumption. The preliminary results on the metabolic behaviour of hydrogen, iodine & caesium indicate that the biological half-lifes of radionuclides such as Cs-137, I-131 & H-3 are likely to be shorter than those in the case of Caucasians.

On the subject of radiological protection, India has organised & hosted Regional Training Courses and provided experts for training courses/workshops organised in other countries of the region. National Workshops & symposia held during 1993/1994 included (i) Conference on Radiation Protection Monitoring: Occupational workers and Public, (ii) National Conference on Disaster Management and (iii) Management of Ageing in Nuclear Reactors.

The Atomic Energy Regulatory Board has recently taken up the job of registration of 50,000 diagnostic X-ray machines installed in the country. About 40,000 persons are covered under Personnel Monitoring Services offered by BARC using films & TLD's. India strongly supports the new proposal for CRP on Applied Research on Air pollution using Nuclear Related Analytical Techniques and would be happy to participate in the same.

5. RESEARCH REACTOR UTILISATION & ENERGY BASED PROJECTS

India has traditionally supported activities relating to research reactor utilisation and has shared its facilities and expertise with scientists of RCA countries in pursuing programmes of mutual interest. India has supplied and installed a neutron spectrometer at the Atomic Energy Research Establishment, Savar, Bangladesh through the IAEA to enable the use of the research reactor at Savar for physics & other studies using reactor neutrons. During 1993 India conducted a Regional Workshop on Applied Aspects of Neutron Scattering at BARC from its extra-budgetary contribution to RCA. The workshop, which was attended by 9 overseas participants & 15 doctoral students from Indian Universities, acquainted the participants with applications of neutron scattering in materials science, metallurgy, chemistry and engineering using neutron beam facilities set up at Dhruva and Cirus reactors. The workshop was very well received by the participants.

India is actively participating in the project on Energy and Nuclear Power Planning. Many countries of the region have shown interest in introducing nuclear power and some have already set up nuclear power plants. It is hence felt that the emphasis in this project may now be shifted towards facilitating the implementation of national nuclear power programmes through pooling and analysis of information on effective strategies used in RCA member states. India would be very happy to organize activities such as a regional workshop for achieving this objective.

6. UNDP PROJECT IN INDUSTRIAL APPLICATIONS OF RADIOISOTOPES & RADIATION

As in the case of the previous UNDP funded Industrial project, India has been actively involved in the formulation and implementation of the new UNDP project. India hosted the first major event of the new sub-project on Nuclear Analytical Techniques (NAT) in the form of UNDP-RCA-IAEA Regional Workshop on Environmental & Industrial Applications of Nuclear Analytical Techniques organised at BARC during January 24-February 11, 1994. A total of 15 participants from 9 countries and 2 observers from India participated in the workshop, which highlighted different nuclear analytical techniques that can play a crucial role in vital support to various aspects of industrial development and environmental pollution monitoring. A national symposium on strategic and Hi-tech Metals Extraction and Process characterization being held during March 21-23, 1994 will highlight environmental impact and analytical methods for environmentally sustainable

development. The radiotracer services group of Isotope Division, BARC continued to offer specialised services to industry in the areas of leak detection, column scanning, flow measurements, sediment transport, pollutant dispension studies etc. Radiation sterilization of medical products showed sustained steady growth requiring upgradation of cobalt-60 sources installed in the various commercial plants to meet the increased demand. In the field of NDT, national training activities were sustained and the development of portable isotope radiography equipment was pursued. The use of nucleonic control systems in various industries is increasing and different types of NCS for various applications are now made by the Electronics Corporation of India Ltd.

An International Conference on Applications of Radioisotopes & Radiation in Industrial Development (ICARID-94) was organised at Bombay during February 7-9, 1994 by National Association for Applications of Radioisotopes & Radiation in Industry (NAARRI) in co-operation with the IAEA and co-sponsored by the Department of Atomic Energy, Government of India and Indian Nuclear Society. The conference, which was attended by over 300 participants including about 50 from overseas, discussed the present status of industrial applications of tracer technology, radiation processing, nucleonic control systems, non-destructive testing and nuclear analytical techniques. The conference also provided an opportunity to discuss the progress made in the Asia-Pacific Region in industrial applications through the implementation of the UNDP Industrial Project under RCA.

7. INDIA'S EXTRA-BUDGETARY CONTRIBUTION TO RCA

As already indicated, India conducted a Regional Workshop on Applied Aspects of Neutron Scattering at BARC during November 22 - December 10, 1993 using its special contribution to RCA. During 1994 - India will organise a Regional Workshop on INIS out of its special contribution to RCA. The details of the 2 weeks workshop will be finalised at the meeting of INIS Liaison officers from RCA member states, scheduled to be held in New Delhi shortly. The workshop will be held at BARC, Bombay during December '94/January '95.

We propose that India's contribution to RCA for 1995 be utilised for organising a Regional Workshop on Strategies for Implementation of Nuclear Power Programmes in RCA countries. The workshop could discuss issued relating to:

i) Energy resource profile in the countries of the region, role of nuclear power and its timing of introduction

ii) Setting up of essential infrastructure relevant to nuclear power development

iii) Experience on siting, construction and operation of nuclear power plants

iv) Other relevant issues such as funding, construction schedules, public acceptance, standardization of designs, regulatory aspects and improvement in performance levels.

Along with India, countries such as Korea, China etc. could contribute to the workshop by sharing their experiences. We look forward to receiving your valuable comments on the proposal.

8. CONCLUSION

India values its long standing association with the RCA member states and looks forward to continued & sustained participation from all RCA member states in the future activities of RCA. We on our part will continue to contribute our mite to RCA activities and offer full support in the implementation of various scientific & technical programmes under the RCA.

Annex 27

COUNTRY STATEMENT OF INDONESIAN DELEGATION
AT THE 16th WORKING GROUP MEETING
BALI, INDONESIA 22-25 MARCH 1994

Mr. Chairman,

It is my great pleasure to participate at the 16th RCA Working Group Meeting held in Bali, Indonesia. It is a great honour, indeed, to my country to host this important meeting. Indonesia is for the second time hosting the RCA Working Group Meeting, the first one was held in Jakarta in 1981, thirteen years ago.

We all know that RCA is an effective instrument of regional co-operation within the member countries of Asia and the Pacific. We are confident that all RCA member countries have gained much from this regional co-operation, not only in the transfer of nuclear science and technology, but also in the development of skilled human resources. Much progress has been achieved from this regional co-operation and significant development has resulted in various applications of nuclear technology. Limited budget is the utmost constraint in the intensification and extensificaiton of the programme.

We are happy to note that the implementation of the new UNDP/IAEA/RCA Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development can be realized.

My delegation has noticed with great pleasure that in the statement made by the Director General of the National Atomic Energy Agency (BATAN) at the opening ceremony of this meeting, Indonesia has expressed its intention to give a voluntary contribution to the new UNDP/IAEA/RCA Project of fifty thousand US dollars for the period 1994-1997.

My delegation would like to take this opportunity to present its Country Report on the progress made in Indonesia during the last year.

UNDP/IAEA/RCA Regional Project

1. Radiation Technology

Indonesia participated at the National Co-ordinators' Meeting held in Takasaki, Japan, 6-9 September 1993. No activities in this regard have been executed yet in Indonesia.

2. Tracer Industry and NCS

Activities related to tracer technology and NCS conducted during the period of 1993 and early 1994 are as follows:

i) Demonstration of tracer technique for mercury inventory in PT Industri Soda Indonesia to measure the amount of mercury lost during the electrolytic process.

ii) Project on Enhanced Oil Recovery is still being carried out in the oil field Lirik, South Sumatera.

iii) CAIR-BATAN has joined the ANSTO Project on Study of Residence Time Distribution in Gold Processing Plant at Kelian Kalimantan.

iv) A project on Column Scanning has been carried out in a chemical industry plant, PT. Asahimas in West Jawa.

v) A two days NEMS has been carried out in Jakarta, August 1993, in collaboration with Tracerco-ICI, attended mainly by petrochemical and oil industry people.

vi) A one day Seminar on Nuclear and Other Advanced Techniques in the Oil Industries has been conducted in Jakarta, early January 1994, in collaboration with AEA Technology, UK.

Vii) Indonesia has participated at the National Co-ordinators' Meeting for Tracer and NCS, July 1993, Sydney, Australia.

3. Non-Destructive Testing (NDT)

Indonesia has participated at the National Co-ordinators' Meeting, Tokyo, Japan, 30 August - 2 September 1993 and the NDT Proficiency Programme Review Meeting, Melbourne, Australia, 26 - 28 January 1994.

The following activities have been executed in Indonesia to follow up Recommendations of the Tokyo Meeting, namely:

i) Collection of inquiries for data base/bank is still in progress. It is expected to be finalized soon for NDT Conventional Methods, levels I and II.

ii) PTP for Ultrasonic Thickness Measurement will be conducted in August to December 1994 in collaboration with NATA-Australia.

iii) A co-operation between the Indonesian Society for NDT and the Bangladesh Society for NDT was signed in August 1993.

iv) There are some difficulties in the data collection with the introduction of the new format, however, efforts are still continuing. There are more than forty registered government and private owned companies dealing with NDT activities in Indonesia.

v) For the future PTP Programme, Indonesia is facing difficulties in the fabrication of test specimens, and therefore assistance from the Japanese Government is needed in the form of expertise as well as test specimens.

4. Nuclear Analytical Techniques (NATs)

Indonesia has participated at the first National Co-ordinators' Meeting on NATs, in Kuala Lumpur, Malaysia, 22-25 June 1993 and the second one held in Tokyo, Japan, March 1994.

In line with the recommendations made by the First National Co-ordinators' Meeting, the following activities have been carried out in Indonesia:

i) Validation of neutron activation analysis procedures by inter-comparison studies among the existing laboratories within BATAN was carried out for synthetic samples prepared by participants.

ii) The work was continued with the analysis of unknown particulate samples, e.g. NIES no. 8 (vehicle exhaust particulate), obtained from Japan and SRM 2704 (Buffalo River Sediment) from the National Institute of Standards & Technology, USA. Good to fair agreement with the certified values was obtained for as many as 13 elements.

iii) Analysis of environmental samples collected from the Jakarta area by the Environmental Management Centre. Samples were collected on glass fibre filter paper using high volume samplers. Qualitative identification in ten samples by X-ray fluorescent (XRF) analysis, showed the presence of iron, copper, zinc, aluminium, and silicon. Preliminary quantitative analysis by XRF showed that iron and zinc content in the samples are in the order of 0.1%.

iv) Determination of mercury, arsenic and selenium in Cikapundung river water, i.e. a river that crosses the city of Bandung, by co-precipitation techniques using di-benzyl-di-thio carbamate (DBDTC) followed by instrumental neutron activation analysis for elemental contents in the precipitate. One interesting finding was the observation that the mercury contents in the samples from the downtown area was 5-8 fold higher (6-10 ug/1) than those taken from a location where the river enters the city. Samples were collected in the dry season and further studies will follow.

v) In co-operation with the School of Medicine of Padjadjaran University (in Bandung), a national project was set up for the neutron activation analysis of selenium and zinc in human serum of cardiovascular disease patients compared with normal values. It was found that the relative risk for cardiovascular disease in selenium deficient female individuals is five times higher than that for a normal person.

vi) The use of Nuclear Analytical Techniques in industry is limited due to lack of nuclear instrumentation and availability of competing analytical methods. Nuclear Analytical Techniques should be offered as complementary methods.

Medical and Biological Applications of Nuclear Techniques

1. Radioimmunoassay for Hepatitis B Diagnosis

Indonesia has regularly received Hepatitis B SPRIA Kits and equipment from the Agency to be distributed to the participating laboratories. Starting from early 1994, only raw materials and reagents have been provided by the Agency instead of ready made kits, so that to accomplish a SPRIA kit, we have to produce locally part of the reagents (e.g. coated bead of HBsAg and Anti-HBs). The reagents have been prepared by the Radioisotopes Production Centre (RPC)-BATAN and distributed to the participating laboratories together with the reagents supplied by the Agency.

There are four laboratories in Jakarta and one in Bandung taking part in this project. Two other interested laboratories have been proposed to the Agency to join the project. Since autobed washers are not available yet in both laboratories the programme cannot be initiated yet. Therefore, we kindly request the Agency to provide both laboratories with an autobed washer soon.

Highlights derived from this project are namely:

i) Clinical studies on Hepatitis B diagnosis of several different subjects have been carried out by participating laboratories.

ii) Local training course has been successfully conducted to familiarize the operators with SPRIA Hepatitis B Kits.

iii) Parts of the reagents have been successfully prepared by local technology (e.g. coated bead for HBsAg and Anti-HBs).

2. Radiation Sterilization of Biological Tissue Grafts

At present work on the procurement, preparation and storage of tissue grafts is underway. Additionally, work on the mechanical properties as well as the microbiological content of freeze-dried radiation-sterilized amniotic and pig skin membranes, human femorial head and bovine cancellous bone has been established. Several Standard Operating Procedures (SOPs) have been prepared and used to produce high quality grafts. Work on the effect of packaging materials and irradiation doses up to 30 kGy on tissues has also been

done. Seven scientific papers on those subjects have been published. Work on the effect of procurement and radiation doses and systemic effect of amniotic membranes is still going on, as well as work on procurement of freeze-dried radiation sterilized AAA-bone (human and bovine). BATAN Tissue Bank receive two to four human femoral heads from Siaga Raya Orthopaedic Hospital, Jakarta, monthly and the processed bone will be used at the same hospital.

Leprasorium Sitanala Tangerang, West Jawa, has produced radiation sterilized air-dried amnion membrane for their own purposes and to date about 200 pieces have been produced and sterilized by irradiation at CAIR-BATAN. The Hospital has sufficient space and limited equipment to support the activities. One member of the Hospital has been trained at CAIR-BATAN Tissue Bank on procurement and preparation of radiation sterilized amniotic membranes.

For the next five years increasing items of tissue grafts will be promoted by increasing the skill and abilities of staff. Preparation of high standard tissue grafts will be supported by knowledge of GMP, SOPs and regulations. Under the IAEA technical assistance programme and partial financial back up by the Government of Indonesia, it is expected three surgical tissue banks could be established in Jakarta, Surabaya and Padang.

3. The Standardization of I-131 Treatment for Hyperthyroidism with an Intent to Optimize Radiation Dose and Treatment Response

Indonesia has submitted two CRP proposals to the IAEA, namely one from Mohamad Jamil Hospital, Padang, West Sumatera and the other from Hasan Sadikin Hospital, Bandung, West Jawa with the hope of getting approval for both.

4. Nuclear Instrument Maintenance

Indonesia has participated in this CRP since the beginning. Participating institutions in the country are namely: Yogyakarta Nuclear Research Centre, Sardjito Hospital Yogyakarta, Sutomo Hospital Surabaya, Karyadi Hospital Semarang and Sanglah Hospital Bali.

During the first three months (December 1993 - March 1994) the following activities have been carried out:

i) Request for a Service Manual for SPECT ADAC-Genessys, especially the last paragraph concerning Preventive Maintenance through the assistance of the former ADAC expert, Dr. Ian Kirkbride (not succeeded).

ii) Preparation of General PM Protocol (PM levels 1 and 2) for SPECT ADAC and some key nuclear medicine equipment such as Renograph, Dose Calibrator, Gamma Conter, etc.

iii) To accomplish inventory of Nuclear Medicine Centre Laboratories and instruments covered by the project.

iv) To carry out experiments on QC-test and performance test of SPECT in Sardjito Hospital in determination of optimum performance of the equipment.

v) Continuation or routine visits to the hospitals and preparation of phantoms to be delivered to hospitals outside Yogyakarta and the training of operators.

Agricultural Projects

1. Food Irradiation Process Control and Acceptance

Indonesia has actively participated in the project since the beginning. The project was terminated in 1993. Indonesia has strongly supported the proposal for the continuation of the project at the RCA Representatives Meeting in Vienna, Austria, September 1993.

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

Indonesia is not participating in the project, however, a similar project has been carried out by CAIR-BATAN.

Research Reactor, Energy Based and General Project

1. Research Reactor Utilization

A RTC on Research Reactor Utilization with special emphasis on Calculation and Measurement of Neutron Flux and Spectrum in Research Reactors was held from 27 September - 15 October 1993 in Serpong, Indonesia. Thirteen participants from eight RCA Member countries participated at the RTC.

Indonesia has participated at the Project Formulation Meeting held in Seoul, Korea, 22-26 October 1993. Indonesia has also participated at 'The Regional (RCA) Workshop on Applied Aspects of Neutron Scattering', BARC, Bombay, India, 22 November - 10 December 1993.

2. Energy and Nuclear Power Planning

Indonesia hosted the First Project Formulation Meeting on Energy and Nuclear Power Planning, held at CAIR-BATAN 19-23 July 1993. The meeting was attended by participants from twelve RCA Member Countries.

Radiation Protection Projects

1. Radiation Protection Infrastructures

Three phases of the inter-comparison activity have been completely finished. Phase-1 was carried out in 1990, Phase-2 in 1991 and Phase-3 in 1992.

i) Phase-1: doses evaluated by the Centre for Standardization and Radiation Safety Research (CSRSR) was 21.7% lower than its radiation value given by JAERI.

ii) Phase-2: deviation of output measurement of calibration source varied from -0.87% to 4.1% and doses evaluated by CSRSR varied from 0 to 7.0% after applying fading correction of 15%.

iii) Phase-3: deviation of doses evaluation by CSRSR with its irradiation value given by JAERI varied from 2.1 to -10% for deep doses measurement and from -1.2% to 16.7% for skin doses measurement.

2. Reference Asia Man

The survey was carried out in North Sumatera, East Jawa, and East Nusa Tenggara with the cultural and socio-economic level of each ethnic group being taken into consideration.

The data obtained from Jakarta, North Sumatera, East Jawa and East Nusa Tenggara were reported and presented in the last RCM in Tiajin, China, October 1993. Finally, it was decided in the RCM that Reference Asia Man will be calculated statistically based on the data of corresponding countries referring to the mid point data.

Principally, the data from Indonesia, Philippines and Bangladesh is neither sufficient nor representative of the population. Besides, since Indonesia started using nuclear technologies, the radiation safety for the people should be enhanced. For those reasons, research will be continued so as to get reliable and representative results covering the people and area of Indonesia. Research will be financed by the government budget.

Miscellaneous

Indonesia has the honour to be the host country once again to the UNDP/IAEA/RCA Office for the Project Officer Prof. Pham Duy Hien and will give full support and co-operation to him as was given to his predecessor in the past.

Thank you,

Bali, Indonesia 22-25 March 1994

Annex 28

JAPANESE COUNTRY STATEMENT

at

THE 16th WORKING GROUP MEETING

BALI, INDONESIA

MARCH 1993

Mr. Chairman, Distinguished delegates, Ladies and Gentlemen,

The Japanese delegation wishes to extend its sincere appreciation to the Government of the Republic of Indonesia for its diligent work in planning, arranging and organizing this important meeting, and also wishes to express its gratitude for the Indonesian hospitality extended to all of us.

Japan always finds the RCA a very serviceable architecture, and is pleased to note the continued progress of the RCA activities. Seeing that the increasingly expanded use and application of nuclear-related techniques in the RCA countries have so far brought enormous advantages in such fields as industry, environment, and medicine, we should stress the importance of promoting further peaceful application of nuclear technology so as to bring sustained economic development in, and to bring social benefits to, the region. Therefore, Japan is willing to continue supporting the RCA activities as ever, not only with its technical expertise but with its financial resources, the RCA being one of the most important vehicles for cooperation of this kind. And Japan hopes to see the spirit of mutual cooperation, self-reliance, and mutual-understanding, which has indeed destinguished the RCA as a guiding light for other regional co-operative undertakings, prevailing: the very fact of which the RCA is so proud.

Regarding further development of the RCA co-operation, Japan believes that it depends upon (1)selection of promising projects which well correspond with the real needs of the RCA Member States, and upon (2)the Member States' manifesting self-help spirit. Of course, smooth communication and coordination should be maintained between the IAEA and the Member Countries. It also seems sound and appropriate to take into consideration the limit of the RCA financial resources. If such a financial limit exists in considering a new project, we have to explore with courage the possibility of employing the scrap-and-build principle. Japan also believes that it is indispensable to have and maintain an appropriate "review process" in a project so as to ensure efficiency and effectiveness of the project. Bearing the aforementioned points in mind and expecting them to be paid due attention of other member states, Japan is eager to continue to extend as much support and contribution to the RCA as possible, with emphasis on the further development of the human resources in the region, as ever, through such measures as sending of Japanese experts and of receiving foreign experts to the meetings held in Japan, with a view to seeing the region further prosper.

Mr. Chairman,

Speaking of the Industrial Applications project, we are convinced that the bridging project in 1992 has handed over ample momentum to its successor project, "the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development" (or the "Environment Project"), which finally started in 1993.

Japan reiterates on this occasion its strong support to the "Environment Project", a UNDP/RCA project. Japan has had the intention to

provide as much technical and financial support as possible to this project like it did for the past UNDP/RCA Industrial Project. From this viewpoint, in 1993 Japan hosted various meetings (e.g. First Meeting of National Co-ordinators for Radiation Technology held in JAERI, TRCRE, in September; First Meeting of National Co-ordinators for Non-Destructive Evaluation held at Japanese Society for Non-Destructive Inspection from August to September) and had several Japanese experts attend meetings overseas(e.g. First Meeting of National Co-ordinators for Nucleonic Control System and Tracer Technology held at ANSTO [Australia], in July). We are proud of having been able to help the " Environment Project" start functioning smoothly.

Mr. Chairman,

With respect to Medical and Biological applications Project, Japan will in 1994 extend as much technical and financial support as possible in such a sub-project as "Standardization of I-131 Treatment for Hyperthyroidism". As for a successor project to the "Computer-assisted Plannning and Dosimetry in Radiotherapy of Carcinoma of the Cervix" (or the "Improvement of the Cancer Therapy" project) that was funded totally by Japan, Japan intends to make efforts to get an appropriate successor project materialized.

Talking about the 1993 activities, Japan sent several experts to meetings overseas where related matters have been discussed, including the Meeting on IAEA Co-ordinated reserch program (CRP) on Evaluation of the Imaging Procedures for the Diognosis of Liver Diseases held in India in February).

As regarding Phase III Food Irradiation Project, Japan ceased its financial support, due to its domestic reasons towards food irradiation, at

the completion of Phase I. Japan, however, remains interested in considering in-kind cooperation to limited aspects of receiving foreign trainees and sending its experts on a case-by-case basis.

As regards the Research Reactor Utilization Project, Japan will continue to extend possible support on a case-by-case basis through, for instance, sending its experts, accepting foreign researchers and trainees etc, taking into account the RCA financial situation. In 1993 Japan sent an expert to a regional workshop.

With regard to Strengthening of Radiation Protection Japan will in 1994 continue to support this project technically and financially, bearing in mind the importance of nuclear safety in the RCA Member States where uses and application of nuclear techniques are expanding. Especially, Japan intends to contribute to a sub-project, the "Compilation of Analytical, Physiological, and Metabolic Characteristics for a Reference Asia Man". In 1993 Japan several experts to meetings abroad including the Final Reserch Co-ordination Meeting for CRP for "Compilation of Analytical, Physiological, and Metabolic Characteristics for a Reference Asia Man" held in China in October. Japan hosted the Expert Meeting on Intercomparison of Radioactivity Measurement for Environmental Samples held in October.

Japan in principle supports the Proposed RCA Project Activities for 1994.

As for the RCA budget for 1994, Japan is not in a position to commit itself to a specific amount of contribution. As in the past, however, Japan will provide as much financial support as possible to the RCA in 1994. From 1980 to 1993 Japan provided extra-budgetary contribution of about U.S. $5,700,000 to the RCA activities.

With regard to the question of trans-regional financing of RCA projects , Japan believes that a regional cooperation scheme such as the RCA should function to plan and implement such projects that highly interest its member countries; that a project should be planned and implemented based on the principle of self-reliance and within its own cooperative framework. It is likely that receiving financial support from outside the Member Countries introduces consequently a certain other, if not dangerous, elements to the RCA's tradition.

In case the RCA budget could not correspond with strong willingness expressed by Member Countries to increase the number or to expand the scale of activities, realistic approaches would need to be adopted. It would be necessary in such a case to consider a possibility of putting some projects with lower priority on the RCA footnote a/ project list to look for interested donors out of the region, or explore a possibility of RCA's finding alternative multilateral sources of funding.

Thank you, Mr. Chairman.

Country Statement of the Republic of Korea
The 16th Working Group Meeting of RCA Member States
Indonesia, 22 - 25 March, 1994

Mr. Chairman, Distinguished Delegates, Ladies and Gentlemen,

It is my great pleasure to participate in the 16th Working Group Meeting of RCA Member States now being held in Bali, one of the most famous tourist destinations in the world. On behalf of the Korean delegation, I wish to express my congratulations on your election to chairman of this working group meeting.

My delegation also would like to express our gratitude and appreciation to the Government of Indonesia for hosting this meeting and for the warm hospitality extended to us.

The RCA, in its 22 years of existence has made valuable contributions in the promotion of peaceful uses of nuclear science and technology for the mutual benefits of this Region. The Republic of Korea has actively participated in almost all RCA programmes since its inception in 1972. We are confident that the RCA is the most useful vehicle for the transfer of technology of nuclear science and technology to industries in the Region.

Now, I would like to take this opportunity to give a brief accounting of the status of RCA activities in the Republic of Korea during the past year.

I. Regional Industial and Environmental Project

1. Tracer Technology and Nucleonic Control System

A series of gamma-ray transmission scans in the air distillation

column was carried out through the cooperation between the Tracerco, Australia and the Korea Atomic Energy Research Institute.

An expert supported by the Agency was assigned to Korea with a national tracer group and expert for two weeks to conduct experiments for the measurement of residence time distribution of a pilot plant. Intensive discussion and consultation was undertaken to improve the RTD analysis computer programme and experimental data was analyzed by using the computer programme.

Two experts participated in the regional training course on the application of modern isotope techniques to industry which was held in ANSTO, Australia. The National coordinator for the project attended the first meeting of national co-ordinators for the project.

A national seminar on process optimization using tracer technology in the chemical and refining will be held 22-24 March, 1994 at the Korea Atomic Energy Research Institute with the provision of 3 experts from the Agency, 1 expert from Australia and 1 local lecturer. In this regard, the government of Korea would like to thank government of Australia for the countribution of expertise to Korea.

2. Non-destructive Testing

The proficiency testing program for NDE (RT & UT) which was recommended by the first meeting of national co-ordinators for the project last September, was conducted for 14 Korean examinees (7 for RT, 7 for UT) at KAERI by 4 experts supported by the Agency. In line with this program, the national co-ordinator recommended the Korean government authority to enhance proficiency testing programs of NDE for qualification, certification and re-certification.

The national co-ordinator attended the first meeting of national co-ordinators for the project from 30 August to 2 September in Tokyo, Japan.

3. Radiation Technology

12 electron beam accelerators are in commercial operation or in progress of installation in private companies in Korea for the purpose of crosslinking of wire, curing of coating crosslinked polyethlene foam precuring of tire rubber.

The Co-60 irradiator (62k Ci) and electron beam accelerator (300 Kev, 25mA), supported by the UNDP to Korea were successfully reinstalled last year at Taejon site from Seoul site and are now in operation.

The Samsung Heavy Industry Co. Ltd, a local private company has installed a new electron beam accelerator (1 Mev, 40 mA) to conduct research and treatment of flue gas and waste water.

The National co-ordinator attended the first meeting of national co-ordinators for radiation technology held in Takasaki, Japan.

4. Nuclear Analytical Techniques

Korea has set up an industry-university-institute national network for enhancement of nuclear analytical techniques involving the environment and has carried out this project as one of a Long-term Nuclear Research and Development Programme in 1993. The National Co-ordinatoor was participated in the first meeting of this project last June which was held in Kuala Lumpur, Malaysia.

Korea is willing to participate in the CRP concerning research on air pollution using nuclear-related analytical techniques to identify major sources of air pollution as part of the future work plan recommended by the first NCM to reduce air pollution in this region.

3. Imaging Procedures the Diagnosis of Liver Diseases (Phase-II)

Korea participated in the co-ordinated research program of this project involved in the diagnosis of gray scale ultrasonography and radionuclide scintigraphy samples from the National Institute of Radiological Science of Japan in 1993. The National co-ordinator attended the meeting of national co-ordinators and presented a program concering local activities in Korea.

4. Improvement of Cancer Therapy (Phase II)

Korea participated in the CRP on computer-assisted planning and dosimetry in the radiotherapy of carcinoma of the uterine cervix which was held in the Asia and Pacific Region. In addition to the activities of the CRP, Korea will host the final research co-ordination meeting of this project at the Korea Cancer Center Hospital of KAERI from 28 to 30 March, 1994 with 10 Chief Scientific Investigators representing India, Indonesia, Japan, Pakistan, Philippines, Russian Federation, Sri Lanka, Thailand and the Republic of Korea.

Furthermore, to activate this project, Korea will host a regional training course from 5-16 September, 1994 concering radioimmunoassay and immunoscintigraphy for the early detection and management of cancer.

5. External Quality Assessment Scheme(EQAS) for Thyroid Related Hormones (RAS/6/001)

The Seoul National University Hospital is one of the three regional centers in this EQAS. In 1993, the hospital was in its third year of operation in the EQAS project with 8 laboratories from Philippines and 52 laboratories from Korea participating in the regional center. In these laboratories, the hospital maintained external quality control of T4, T3 and TSH hormones. Furthermore, the hospital expanded the EQAS project for other RIAs including beta-HCG and alpha-fetoprotein. A national coordinator attended the national co-ordinator meeting of this

project. In January of this year, the hospital started the fourth year operation in the EQAS with participation of some laboratories of the Philippines.

6. The Standardization of I-131 Treatment for Hyperthyroidism With An Intent to Optimize Radiation Dose and Treatment Response.

In 1994, Korea will participate in this CRP project to obtain and to analyze Asia-wide statistics on remission rate and post therapy hyperthyroidism, and provide standardized protocal of I-131 treatment to patients with Grave's disease as proposed by the RCM.

7. Nuclear Instruments Maintenance

When the CRP was initiated in Korea in 1984, 48 SPECT cameras were installed in some hospitals in Korea and have now increased to 128 in number. The Chief Scientific Investigator visited about 80 medical centres where the cameras were installed to carry out QC tests and to give lectures. As a result of this visit, the number of medical center adopting this procedure have rapidly increased, although some medical centers are still not in a position to carry out QC on a regular basis.

III. Agricultural Projects

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

The government of Korea hosted the final Research Co-ordination Meeting of the Co-ordinated Research Programme of this project from 20 to 24 September, 1993 at the Korea Atomic Energy Research Institute, Taejon. Australia, Bangladesh, the People's Republic of China, India, Indonesia, Japan, Pakistan, Sri Lanka, Thailand, Vietnam and the Republic of Korea participated in the meeting.

During 1993, Korea carried out research on the commercial storage of dried red pepper and dried anchovy by gamma irradiation. The Korean government authority has approved a total of 17 food item for gamma

irradiation. A Private company, the Greenpiatech, is operating a 450 kCi Co-60 irradiator for radiation sterilization of medical products and additional food items.

Most of the food industries in Korea fully recognize the benefits and advantages of irradiation techniques, however, there is still wide concerns amongst the general public against the use of this process. In this regard, the government of Korea has taken the position that the Agency and/or UNDP will do more to provide the general public, consumers' groups, and journalists with proper information and education programs to enhance public acceptance of irradiation techniques.

Furthermore, Korea would like to suggest that the Agency initiate a development of irradiation techniques for the hygienization and processing improvement of herbs in the Phase-IV programme since bio-drugs made from herbs are recognized as important natural drugs by the RCA member states.

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

Korea is willing to participate in the program 'Induced Mutation and Related Biotechnologies for Improvement of Vegetatively propagated Crops as proposed by the Agency.

Vegetatvely propagated crops such as potato and sweet potato are major crops in this region. Demands for these crops have rapidly increased since 1970. However viral disease is still a big problem in the production and quality in these crops.

Since 1984 the Korea Atomic Energy Research Institute has studied crop resistance to disease by using the vitro mutagenesis technique. In potatoes, many mutants were selected in vitro. Cultured plant cells and tissue were treated with gamma rays. The somaclonal variation can be used in various agronomic studies of the characteristics of crops.

Mutation breeding and tissue culture techniques are already established throughout the region.

We propose that the Agency and the RCA member states support this project in order to promote technology and to pursure mutual interests and social benefits in the region.

Korea also holds the position that the Agency and RCA member states will support the new proposal, "The Environmental Advantages of Fruit Fly Control with the Sterlile Insect Techniques" presented at the RCA Representative Meeting held 29 September, 1993 in Vienna. Korea is interested in the use of the sterile insect techniques to protect pumpkin or water melon fruits from destruction by pumpkin fruit fly (Paradacus Depressus).

IV. Research Reactor, Energy Based and General Projects

1. Research Reactor Utilization

The government of Korea sponsored the Project Formulation Meeting from 18 to 22 October, 1993 at the Korea Atomic Energy Research Institute. 11 participants from RCA member states, with the exception of the People's Republic of China, Japan, Mongolia and Singapole, and 22 local observers participated in the meeting.

The meeting participants acknowledged the important role of the IAEA in promoting and supporting research reactor utilization for RCA member states during the first phase of this project from 1990 to 1993 as well as association with the CRP. In this regard, the government of Korea holds the position that the Agency shall support the future 5 year programme 1995 - 1999 as recommended in the Project Formulation Meeting.

Two experts participated in the regional training course on calculation and measurement of neutron flux spectrum for research reactors held in

Indonesia and the regional workshop on applied aspects of neutron scattering held in India, respectively.

2. Energy and Nuclear Power Planning

Korea has actively participated in the first phase to strengthen co-operation amongst RCA member states in energy, electricity and nuclear power planning with special emphasis placed on the IAEA's computer models.

A national co-ordinator attended the Project Formulation Meeting on energy and nuclear power planning held in BATAN, Indonesia. The government of Korea will actively participate in the future 5 year programme recommended by the project formulation meeting to attain common interest in the region with an emphasis on continuation and espansion of the training course on the IAEA's planning models to cover not only WASP, but also the MAED and ENPEP methodologies and improvement the information to integrate national databases for the conduct of energy and nuclear power planning analysis.

Korea also holds the position that the Agency will secure contributions received from international organizations such as ADB, ESCAP or World Bank to guarantee this project.

3. Korea's Extra-budgetary Contributions to the RCA.

Since the 1988 the government of Korea has assisted a regional training course annually as an extra-budgetary contribution to RCA. From 7-27 September 1993, Korea conducted a Regional Training Course on Industrial Application of Non-destructive Testing and Evaluation in co-operation with the Korea International Cooperation Agency (KOICA). Fifteen participants from 10 regional countries attended the course.

Korea proposed the organization of a Regional Training Course on Industrial Application of Non-destructive Testing and Evaluation from 30 June to 21 July, 1994 in cooperation with the Korea International

II. Medical and Biological Applications of Nuclear Techniques.

1. Radioimmunoassay for Hepatitis B Diagnosis

The Department of Nuclear Medicine of Seoul National University was designated as a reference laboratory in Korea. The department has conducted a comparative analysis and assessment of Radioimmunoassay (RIA) kits of hepatitis B antigens and antibodies which are made in China with local products. Also, the university measured the basic properties of RIA kits such as positive and negative control and background and nonspecific binding and performed RIAs with five different pool serums comparing them with the results of commercially available kits.

A national coordinator attended the national coordinators meeting held in Colombo, and one expert participated in the regional training course concerning the preparation of basic reagent for the RIA of hepatitis-B markers which was held last April in China.

2. Radiation Sterilization of Tissue Grafts

Korea actively participated in the first phase (1988 - 1992) of this RCA project concerning radiation sterilization of human tissue allografts for the intended clinical use in reconstructive surgical repair of damaged-tissue-related disabilities and will be resuming the second phase of project RAS/7/003. During 1993, Korea initiated the estabilshment of a muscular skeletal tissue bank at Dankuk University with installment of some equipment provided by the Agency.

Some fellowship training is also included in implementation of this project in conjunction with that of the Agency's regular programme. Furthermore, Korea is also willing to participate in the 1994 program, the expert advisory group meeting, the regional training course, and the national co-ordinators meeting.

Cooperation Agency. The training course is comprised of lectures on industiral application of NDT and evaluation, metallurgy and welding, ultrosonic testing, eddy current testing, magnetic particle testing and various methodologies of NDT techniques, site lectures, and technical visits. Each member state in this region is invited to nominate participants for this regional training course.

V. Radiation Projects

Since 1987 Korea has participated in projects relating to development of radiation protection infrastructure in RCA countries. During 1993, one expert attended the regional workshop on the application of the ICRP's recommendations for radiation protection held at UTN, Malaysia, and a project co-ordinator attended the expert advisory group on protocols for measurement and dosimetry held in Vietnam. The CRP of the Reference Asian Man, a work on the collection and generation of physical, anatomical, physiological and metabolic human parameters, continued the development of the human model.

VI. Conclusion

Korea's participation in the RCA programme over the years has been very satisfying and productive. Korea believes that the technical cooperation, regional expertise, and infrastructure developed as a result of the RCA provide significant benefits toward regional prosperity and understanding. Korea looks forward to its continued participation in RCA activities.

Finally, I would like to join other delegates in expressing our appreciation to the government of Indonesia, and the National Atomic Energy Agency for hosting this important 16th RCA Working Group Meeting and for the heartfelt hospitality extended to us during our stay in Bali, Indonesia.

Thank you.

Country Statement of Malaysia

The Sixteenth RCA Working Group Meeting,

22-25 March 1994, Bali, Indonesia

The Malaysian delegation wishes to express its sincere gratitute to the Government of Indonesia for hosting this important meeting with such excellent arrangements,along with the warm hospitality extended to all of us.

Malaysia has actively participated in almost all of RCA activities since its inception in 1975. We believe that the RCA prgramme will continue to be one of the useful and important vehicles for promoting peaceful uses of nuclear tecnology in the field of industry, agriculture, medicine and safety in the region. Since 1975 Malaysia has contributed in-kind to RCA activities and began to contribute her extrabudgetary during the third phase of RCA/UNDP Industrial Project. We hope that the extrabugetary support by the donors including the UNDP for this programme would not diminish.

The summary of activities carried out during 1993 in relation to RCA programme is as follows:

1. **RCA/UNDP Industrial and Environmental Project:**

In the field of **Non-Destructive Testing (NDT)**, a concerted effort by the Nuclear Energy Unit (UTN), the Standards and Industrial Research

Institute of Malaysia (SIRIM), the National Vocatoinal Training Council (NVTC) and the Atomic Energy Licensing Board (AELB) in the implementation of national activities and prgrammes has resulted in a safe as well as systematic and efficient practice of such activities in Malaysia.This technique has been widely accepted and recognized by most industries and government agencies in Malaysia. Efforts are being made to persue a new application of NDT, in particular applications for non- metallic materials. In this matter, experts assistance has been rquested through the IAEA/TC project MAL/8/003 to assist UTN in conducting training course, seminars and to assess the balance between industrial status and NDT requirements in Malaysia.

During the first meeting of the National co-ordinators for NDT which was held on 30 Aug.-2 Sept. 1993 in Tokyo, Japan , Malaysia indicated her willingness to host Regional Seminar and Workshop on NDT Test Pieces in 1994.

Malaysia participated in RCA/IAEA/UNDP Proficiency Testing Programme (PTP) Evaluation Meeting which was held on 26-28 January 1994, Melbourne, Australia and the National PTP will be organised in April 1994 with the assistance from IAEA experts. Malaysia also participated in the RCA Training Course on Industrial Application of Non Destructive Testing and Evaluation, 7 - 27 October 1993, Daejon, Republic of Korea.

As for **Tracer Technology**, a series of lectures and seminar on process optimization techniques with emphasis on engineering process and computer software used in tracer applications have been conducted by theTracer Group at Nuclear Energy Unit (UTN) with the assistance from an IAEA expert, Dr. Jiri Thyn from 8 -18 Nov. 1993. Malaysia participated in the Regional Training Course on the Application of Modern Isotope Techniques to Industry, 3 - 14 May 1993, and also in the UNDP/RCA/IAEA First Meeting of National Co-

ordinators for Nucleonic Control Systems and Technology which was held on 6-8 July 1993 at ANSTO,Australia. Malaysia will host the Regional Workshop on Use of Tracer in Surface Water Effluent Studies on 5 - 16 September 1994 and is willing to host the Regional Field Demonstration on Use of Tracer Technology in Surface and Ground Water in 1996.

Most of the research carried out in the field of **Radiation Technology** are the continuation of the previous phase of UNDP/RCA/IAEA Industrial Project such as radiation curing, radiation sterilization, radiation crosslinking of wire and cable and RVNRL. Nuclear Energy Unit is strongly involved in research on **EB and UV curing of surface coating**. Under the bilateral UTN/JICA, a seminar and workshop on surface finishing by radiation curing technology were organised jointly by UTN/JICA/IAEA on 2-9 September1993. Malaysia is willing to host Regional Workshop on Radiation Curing in 1995.

With respect to **Radiation Sterilization**, irradiation of medical product by gamma irradiator is progressing very well. The gamma plant located at Nuclear Energy Unit (UTN) was awarded ISO 9002 in 1992 and is currently providing irradiation services to local medical product manufactures in Malaysia. This technology has been transferred to local industry whereby a private gamma plant was established last year. Beside providing services, UTN is also carrying out research on radiation compatible materials in order to provide technical advice to the manufacturer of medical products. Work is also being carried out to study the sterilization technique by using electron beam accelerator. Malaysia participated in Regional Workshop on Radiation Processing - the Economic Benefits, 11-16 October 1993, China.

In the field of **Radiation Crosslinking of Wire and Cable Insulation**, the availability of high energy Electron Beam Accelerator (NHV 3.0MeV, 30mA) has enabled research on material development of radiation crosslinkable polymers to be carried out. Most of the work is being performed with the collaboration of local manufactures of wire and cables. It is hoped that the wire and the under-beam handling system will be installed by middle of 1994 to accelerate the R & D of radiation crosslinking of wire and cable. The facility will also be offered to the industries for irradiation services. A few companies have indicated their intention of irradiating PVC wire and cables. A National Executive Management Seminar cum workshop on Product Development of Radiation Crosslinking of Wire and Cables is planned to be held at the end of 1994 after the installation and operation of the under beam handling system.

As for Radiation **Vulcanisation of Natural Rubber Latex (RVNRL)**, a pilot plant irradiator will be constructed at Nuclear Energy Unit to promote the applications of RVNRL in Malaysia. Malaysia hosted the Expert Advisory Group Meeting on Radiation Vulcanization of Natural Rubber Latex (RVNRL) on 23 - 26 Febuary 1993 and is willing to host the International Symposium on RVNRL along with Expert Advisory Group Meeting in 1995. One of the UTN's researcher was on an IAEA expert mission as a lecturer at a seminar held in India from 20 - 25 June 1993.

With regard to **Nuclear Analytical Technique,** Malaysia hosted the First National Coordinators for Nuclear Analytical Technique on 22 - 25 June 1993. As result of the meeting, Malaysia is setting up a National Coordination Committee on Nuclear Analytical Technique to strengthen networking in this area. Malaysia participated in the Regional Workshop on Nuclear Analytical Techniques from 24 January - 11 Febuary 1994, Bombay, India. With regard to a Proposal for a New RCA Co-ordinated Research Programme on Applied

Research on Air Pollution Using Nuclear-related Analytical Techniques, Malaysia strongly support and will participate.

2. Medical and Biological Applications of Nuclear Techniques

Malaysia participated in four projects in the field of medical and biological applications of nuclear techniques. The project on **Radioimmunoassay for Hepatitis B Diagnosis** is conducted by Clinical Diagnostic Laboratory, University Hospital , University of Malaya (UM), in collaboration with Institute for Medical Research (IMR), University Science of Malaysia (USM), Kelang General Hospital (KGH) and Medical Microbiology (MML) of University Hospital. The Clinical Diagnostic Laboratory has successfully developed two techniques for diagnosis of hepatitis B using radioimmunoassay. The first technique involves the dissociation of hepatitis B surface antigen (HBsAg) from immobilised anti - HBsAg antibody in a two site immonometric assay. The second technique involves the use of recycled antibodies immunometric assay. The first technique has been tested and proven to be useful as a quality assurance monitoring of immobilised antibody for next phase of this project. Malaysia participated in the RTC on the Preparation of Basic Reagent for the RIA of hepatitis Markers, 26 April - 7 May 1993. Malaysian national co-ordinator for this project was invited as a lecturer in the RTC.

With regard to the project on **Radiation Sterilization of Tissue Grafts**, two tissue banks have been established namely a national tissue bank located at USM and research tissue bank at UTN. Both banks are involved in the processing of amnions and human bones. Work on xenografts has been initiated in order to produce bovine bone and animal skin. Up to now about 30

burnt patients have been treated by amnions, while bone grafts will be used in orthopaedic surgery next month by General Hospital, Kuala Lumpur.

Malaysia participated in the RCA Workshop on Total Quality Systems for Tissue Banking of Radiation - sterilized Surgical Grafts and RCA Workshop on Radiation Sterilization of Tissues - An Open Learning Programme which were held in August 1993, Indonesia and November 1993, Vietnam respectively.

With respect to the project on **Care and Maintenance of Nuclear Instrument**, Malaysia will host the Regional Workshop on Upgrading of Analogue Gamma Cameras with IBM PCs and Relevant Software on 5 - 23 September 1994.

3. Agriculture and Food

Under CRP on the Use of Isotopes in the **Studies to Improve Yield and Nitrogen Fixation of Common Grain Legumes,** Malaysia participates in the project Improvement of grain legume - Rhizobium Symbiosis to fix Atmospheric Nitrogen. Malaysia participated in The Fourth Research Co-ordination Meeting from 29 August - 3 September 1993,Tamworth, Australia followed by two meetings in Brisbane and Coluun, Australia from 7 - 16 September 1993. Malaysia also participated in the UNDP/IAEA/FAO Regional (RCA) Workshop on Harmonization of Regulations to Facilitate Trade in Irradiated Foods, Sydney, Australia, 6 - 17 December 1993.

With regard to a proposal for a RCA Regional Project on Increasing Crop Yields in the Tropics of Asia and Pacific Through Agroforestry, Malaysia will support and participate in this project.

4. Radiation Protection

With regard to the **Strengthening of Radiation Infrastructure Project,** Malaysia hosted the Regional Workshop on the Application of the ICRP's 1990 Recommedations for Radiation Protection on 16 - 27 August 1993. Recently, Malaysia participated in the Expert Advisory Group Meeting on Radiation Protection Infrastructures, Melbourne,Australia from 14 - 18 Febuary 1994 and followed by Expert Training Workshop on the Preparation of Off-Site Emergency Plans and Counter Measures, Australian Laboratories, Melbourne, Australia from 21 - 25 Febuary 1994 and Expert Meeting on Intercomparison Programme of Radioactivity Measurement for Environmental Samples, 21- 25 Febuary 1994, Tokai, Japan.

5. Research Reactor Utilisation and Energy-Based Project

The first phase of the **Research Reactor Utilisation project** from 1990 to1993 as well as the associated CRP activities have contributed to the upgrading of the level of knowledge and expertise of UTN's pesonnel in areas relating to the operation, management and utilization of research reactors.

It has also increased collaboration among research reactor facilities in the region and raised the utilization of these reactors. Malaysia continues to support and participate in the second phase of this project. Malaysia participated in the Project Formulation meeting on RCA Project Research Reactor Utilisation, 18-22 October 1993, Republic of Korea. Malaysia also participated in RTC on Calculation and Measurement of Neutron Flux Spectrum for Research Reactors, Jakarta, Indonesia from 27 September -15 October 1993 and Regional Workshop on Applied Aspects of Neutron Scattering, Bombay, India from 22 November - 10 December 1993.

In the field of **Energy and Nuclear Power Planning,** the first phase activities have contributed to the upgrading of national energy planning tools and methodlogies in Malaysia whereby a self-sufficient core group of experts on the use of WASPS, MAED AND ENPEP have been established within Tenaga National Berhad (TNB). However with the privatisation of TNB, it is recommended that new alternative core group of experts be established within the Malaysian public sector with active participation from Nuclear Energy Unit.

Finally, the Malaysian Delegation would like to reiterate our strong support and continuous participation in RCA activities and appreciation to the IAEA, donors and all RCA member states for the successful implementation of RCA programme.

The Malaysian delegation also would like to take this opportunity to extend invitation to all member states to Malaysia for the next RCA Working Group Meeting to be held in Kuala Lumpur.

wgm/RH

Annex 31

MONGOLIAN COUNTRY STATEMENT
16TH RCA WORKING GROUP MEETING
BALI, INDONESIA, 22-25 MARCH 1994.

Mr. Chairman, Distinguished Delegates, Ladies and Gentlemen,

Mongolia is very happy to participate in the 16th RCA Working Group Meeting of Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) Member States being held in Bali and I would like to congratulate you on your election as chairman of the meeting. I am confident, that under your wise guidance and experience this important meeting will result in useful and fruitful outcomes.

I would like to take this opportunity to thank the Government of Indonesia for hosting this meeting in Bali and would like to convey the greetings of Mongolian scientists who participated in the activities of RCA to the scientists of the hosting Country and all of the Member States.

Mongolia basically supports and thanks the proposed RCA Project Activities for 1993.

Mongolian scientists have worked with RCA projects over one year and we gained much experience from the scientists of the region. We very much appreciated the visit of Dr. John Easey, during which we had very resultive discussion on future activities of Mongolia in RCA.

Now I would like to report on some activities related to RCA projects:

NUCLEONIC CONTROL SYSTEMS APPLICATION

The National Co-ordinator attended the first Meeting of the National Co-ordinators for Nucleonic Control Systems and Tracer Technology, ANSTO, Lucas Heights Australia, 6-8 July 1993. Mongolia is interested in the use of Nucleonic Control Systems in the mineral processing industry and quality control of coal at a power plant.

NON-DESTRUCTIVE TESTING

The National Co-ordinator attended the first Meeting of National Co-ordinators for Non-Destructive Evaluation, August 30 to September 2, 1993, Tokyo, Japan. A National NDT initiative group has been formed for national co-ordination.

NUCLEAR ANALYTICAL TECHNIQUES

It is very important to use nuclear radiation and isotope technique for the industrial development and implementation of the National Environmental Research Programme.

In Mongolia Nuclear Analytical Techniques such as Photon, Fast and Thermal Neutron Activation Analysis Techniques, using Small Cyclic Electron Accelerator, Neutron Generators and Isotope Neutron Sources, Energy Dispersive X-Ray Fluorescence and Total Reflection X-Ray Fluorescence Analysis Techniques are being used for Environmental Studies and Industry Development.

Mongolia strongly supports a sub-project of the New UNDP/RCA/IAEA Environmental and Industrial Project and participates in the following RCA activities: Intercoparison programme of Radioactivity Measurement and Nuclear Analytical Techniques in Environmental Studies.

Following are the RCA activities in the field of NAT carried out in Mongolia in the last year:

A Total Reflection X-Ray Fluorescence Spectrometer has been set-up for analytical purposes and is used to determine tracer toxic element content in water and food products by the Department of Applied Nuclear Physics, Institute Physics and Techniques, Mongolian Academy of Sciences.

The National Co-ordinator attended the first Meeting of National Co-ordinators for Nuclear Analytical Techniques", 22-25 June 1993, Kuala Lumpur, Malaysia and the Expert Meeting on Intercomparison Programme of Radioactivity Measurement for Environmental Samples", 21-25 February 1994, Tokai, Japan.

Two senior scientists participated in "the UNDP/RCA/IAEA Regional Workshop on Environmental and Industrial Applications of Nuclear Analytical Techniques" at the Bhabha Atomic Research Centre, Bombay, India from 24 January to 11 February, 1994.

DIAGNOSIS OF HEPATITIS B BY RADIOIMMUNOASSAY

The National Co-ordinator of the Project participated in the Meeting of National Co-ordinators of RCA project RAS/6/018, Diagnosis of Hepatitis B (HBV) infection by radioimmunoassay (RIA) held in Colombo, Sri Lanka from 12-15 July 1993 and another specialist attended a 2 week Training Course on Preparation of RIA Reagents, Beijing, China, July 1993. RIA kits for testing HBsAg and anti-HBsAg have been received twice. Radioimmunoassay procedure has been established for diagnosis of Hepatitis B virus markers (HBsAg and anti-HBsAg). Using this technique the project staff was able to conduct the test on human blood samples including blood donors, hepatitis patients and healthy pregnant women, supplied by the central hospital of Infectious Diseases, Central Blood Transfusion Center, Oncology Center and some other hospitals in Ulaanbaatar.

NUCLEAR INSTRUMENTS MAINTENANCE

In the National University of Mongolia a Nuclear Instruments Service Group was created. The Service Group received very important spare parts, books and the power-line monitor service group repaired more than 20 nuclear instruments and more than 100 computers and devices. The National Co-ordinator of the project participated in the Quality Assurance Control Meeting in Nuclear Medicine in Dhaka, Bangladesh and a National Group on Quality Assurance Control was formed.

Mongolia is interested in participating in the following new and on-going RCA projects:

i) Applied Research on Air Pollution using Nuclear-Related Analytical Techniques;

ii) Research Reactor Utilization (RCA) (RAS/4/011;

iii) Energy and Nuclear Power Planning (RCA) RAS/0/013);

iv) Strengthening of Radiation Protection (RCA) RAS/9/006);

v) Survey and Control of Exposure in High Natural Background Radiation Areas; and

vi) Training in Radiation Protection in the Mining and Milling of Radioactive Ores.

Mongolia does not presently have Nuclear Reactors but the necessity to develop a National Energy and Industry Programme is foreseen. Now we will prepare the first step for a study on research reactors, including nuclear power. Manpower development is essential for this.

A high priority project for Mongolia is the development of infrastructure for radiation protection activities as this is an essential pre-requisite for all nuclear related projects. Over the last years we started an activity on the establishment of Radiation Protection Infrastructures in the country under IAEA Technical Assistance. Now we are interested to join and participate in the above mentioned RCA co-ordinated projects: Development of Basic Techniques and Calibration of Monitoring Instruments for Radiation Protection and Intercomparison and Radioactivity Measurement for Environmental Samples, and to actively take part in the activities identified by the RCA Member States for future strengthening of radiation protection infrastructure in the region.

Mongolia proposes new projects on the following subjects:

i) Application and Development of Nuclear Analytical Techniques in Copper-Molybdenum Ores Processing and Coal Mining Industries Mongolia.

ii) Development and Application of Nuclear Analytical Techniques in Determination of Gold and Silver Content in Alloy and it's Purification Technology.

We will ask that the Australian contribution be used to organize a National Seminar on Application of Nuclear Techniques in Resource Development in Mongolia, inviting Australian experts in August and September 1994 to Ulaanbaatar. In this Seminar we will discuss the possibility of the application of Nuclear Analytical and Nuclear Control Techniques in copper-molybdenum ores processing and in Coal Industries Mongolia and to prepare project proposals.

I would like to take this opportunity to express our sincere thanks to Australia and Japan for their generous support to the RCA programme.

Finally, I would like to join other delegates to express our thanks to the Government of Indonesia, the National Atomic Energy Agency, and the Research Centre for Nuclear Techniques, for hosting this important 16th RCA Working Group Meeting and for the warm hospitality extended to us during our stay in Bali, Indonesia.

Thank you.

PAKISTAN
COUNTRY STATEMENT
FOR 16TH RCA WORKING GROUP MEETING
BALI, INDONESIA FROM 22-25 MARCH, 1994

Mr. Chairman, distinguished delegates, ladies and gentlemen.

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

It is my great pleasure to participate in this 16th Working Group Meeting of RCA Member States. On behalf of the Pakistan delegation, I would like to express my gratitude to the Government of Indonesia for its diligent work in planning and hosting this meeting and for the warm hospitality.

My delegation is very happy to remark that the RCA has proven to be a valuable link between the IAEA Member States of South East Asia and the Pacific over the past 20 years of its existence and it will continue to play a useful role in promoting peaceful uses of nuclear techniques in industry, agriculture, biology and medicine.

Pakistan has maintained active participation in the various RCA Projects over the past several years. The summary of activities carried out during 1993 by Pakistan in relation to the RCA programme is as follows:

1. Industrial Projects

1.1 Non-Destructive Testing

The development of non-destructive testing is making a steady progress in Pakistan. Most industries and the government organizations seems to be getting well aware of the needs for inspection, testing and quality control using NDT methods.

PAEC is continuing training of personnel in non-destructive testing techniques (NDT) and more than twenty organizations in the public and private sectors have benefited from various courses in NDT in ultrasonic testing, surface methods and radiography testing. During 1993 four such courses were organised:

- A Level-1 Course on Radiographic Testing at Islamabad from 18 April to 4 May 1993. 18 participants attended the course. Out of these 12 passed and were awarded certificates.
- Two Level-1 Course on Ultrasonic Testing were held at Islamabad from 15 May to 1st June 193 and from 13-29 June 1993 respectively. In total there were 29 participants. Out of these 22 passed the examination and were awarded certificates.
- A Level-2 Radiographic Testing Course at Islamabad from 1-24 August, 1993 . 12 participants attended out of which 10 qualified and were awarded Level-2 certificates.
- A Level-1 Surface Methods Course at Islamabad from 12-24 September, 1993. Out of 15 participants 14 qualified and were awarded certificates.

All these courses were held in accordance with the programmes and syllabi given in Document No.PAEC/SES/NDT-001 which in turn is based on IAEA TECDOC-628 and ISO 9712. A senior scientist attended the meeting of National Co-ordinators for RCA Sub-Project on Non-Destructive Testing held in Tokyo, Japan from 30 August to 2 September, 1993.

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

1.2 Tracer Technology in Industry and Nucleonic Control Systems

National Tracer Group which looks after the radiotracing, radiogauging and other radioisotope applications on national basis made consistent efforts to popularise nuclear techniques in industrial sector through national mass media and undertook industrial surveys to explore the possibilities of radiotracer applications.

Following activities have been carried out:-

Study of radioactivity movement from radioactive waste storage pits.

* Termite studies using radiotracer technique.
* Gamma-ray scanning of large chemical processing towers/distillation columns.
* Automation of gamma ray scanning systems.
* Determination of mixing time of resins in the pulp chest of a paper making plant.
* Measurement of build-up and wear in piping network at a chemical plant.
* Dilution and dispersion of industrial effluents in the surface water.
* Location of seepage zone in oil production well.
* Leakage investigation in an underground pipe line system.
* Estimation of mercury inventory in a caustic soda plant.
* Study of void fractions in a two phase flow system.
* Autoradiography of embedded radiation source.
* Study of seepage from canal.
* Determination of groundwater flow velocity.
* Study of lixiviant movement at a mineral leach mining site.

1.3 Radiation Technology

The sub-project on "Radiation Technology" is covered under the recently approved UNDP Project entitled "The Use of Isotopes & Radiation to Strengthen Technology and Support Environmentally Sustainable Development".

The First Meeting of National Co-ordinators for Radiation Technology was held at Takasaki, Japan in September, 1993 to discuss plan of action for the next 2 years in the following areas which have relevance to environmental problems:-

i) Radiation processing of sewage sludge and municipal waste water.
ii) Radiation processing of flue gases.
iii) Advanced applications of radiation technology of importance to regional industries.

These applications are currently at various stages of development, and we do not have an active programme in these areas in Pakistan for the present. Our interest would be initially to keep ourselves well informed on the technical, and economic aspects of these applications and pass this information on to the concerned agencies, like WAPDA, municipal authorities etc. We sent one participant to attend a regional training course on Fundamental Aspect of Radiation Technology for Environmental Conservation, at Takasaki, 27 Sept. to 8 October 1993.

2. Medical Projects

2.1 Radioaerosol Inhalation Imaging for the Diagnosis of Respiratory Diseases in the Developing Countries

Pakistan is participating in the the RCA Project and continued studies on Tc-99m DTPA Radioaerosol Inhalation Scintigraphy for the measurement of Permeability of Alveolar Membrane in healthy population and compare the results with the state of environmental pollution in the area. This study was continued at INMOL, Lahore and 23 normal subjects were studied for Alveolar Membrane Permeability. The results have been compiled. The data of environmental pollution is being obtained from the concerned department. The Principal Investigator of this project was unable to attend the Research Coordination Meeting held in this connection in December, 1993 at Bombay. Therefore, report regarding the work done during the previous year is being submitted directly to the Agency. The Agency has now decided to extend the permeability studies to more than one cities of the participating countries and provide another Nebulizer to each country for this purpose. As soon as another Nebulizer is received, the work will be extended to other cities of Pakistan.

2.2 Immunoscintigraphy of Recurrent Colorectal Cancer using Tc-99m Labelled Anti CEA Monoclonal Antibody

Immunoscintigraphy of the patients with recurrent colorectal cancer was performed with the antibody received from Germany on 14 patients. The results of this study were presented in the second RCA meeting of the project in Cambridge in March, 1993. The results were highly appreciated as all the cases were positive for recurrent colorectal cancer and because the study was performed in recurent cases only and no in primary tumours. During that meeting it was decided that all the participant should perform these studies in recurrent colorectal tumours and not in primary tumours. After the second meeting of the coordinated group, more antibody was received from IAEA and this study was done in 9 more cases. Results of all thee cases are being compiled for the next RCA meeting. No problem has been faced in labelling the antibody with Tc99m or in performing immunoscintigraphy.

2.3 Hepatitis B Screening

Kits for hepatitis B markers were received from China and distributed to the participating centres in the country. These were used to study the methodology, performance and properties and their applications for different clinical groups (Blood donors, pregnant women, and liver cancer patients). The results have been reported during the National Coordinators Meeting held at Colombo, Sri Lanka from 12-16 July, 1993, attended by the National Coordinator. The kits were received in Pakistan according to schedule without being delayed. Criteria where improvement in performance of the kits is required was also reported during the meeting.

Currently studies have been started at INMOL for production of reagents at INMOL and their use. In this respect glass beads coating technique for antigen/antibody has been completed. Next study will be to use these locally coated Ag/Ab and to radiolabel Ag/Ab provided IAEA could arrange to supply the required unlabelled Ag/Ab.

- Two scientists from Atomic Energy Medical Centre, Multan and Institute of Radiotherapy and Nuclear Medicine (IRNUM), Peshawar participated in the regional training course on Production of Hepatitis B Marker Reagents held in Beijing from 26th April to 7 May, 1993.
- A request has been submitted to the Agency to provide expert services for a period of 2-4 weeks of Dr. Ch'ng from Malaysia during April 1994 for the production technique development. Confirmation of assignment is still being awaited.

2.4 External quality assessment scheme (an ongoing activity - as a satellite project)

This activity completed under RCA project RAS/6/011 was followed up during the RAS/6/018 National Coordinators Meeting (1993) as a satellite meeting. Country report on the project was submitted during the meeting and the next year work plan of the project was prepared. INMOL, Lahore is participating as one of the regional coordination centres alongwith Chula Longkorn Univ., Bangkok and NUH, Seoul.

2.5 Computer Assisted Planning and Dosimetry in Radiotherapy of Head and Neck Cancer

The chief scientific investigator of the project attended the Research Co-ordination Meeting and presented a paper on "Computer assisted Planning and Dosimetry in the Radiotherapy of Head and Neck Cancer" held in Vienna, Austria from 20-22 September, 1993.

2.6 Computer Assisted Planning and Dosimetry in Radiotherapy of Carcinoma of the Cervix in Asia and the Pacific Region.

IAEA provided PC-based treatment planning system alongwith the software in 1992. The project was completed in three phases. The first consisted of the application of PC in radiotherapy and preparation of optimum software. The second was to compare the two different softwares to finalise the best among them. The third and final part was successfully completed in 1993. Considering the comparison of the two treatment planning systems using the traditional approach for Ca-Cervix patients. We

constituted two parallel arms including 50 patients of Ca-Cervix in each arm. The Isodose distribution, dosimetry, acute and chronic reactions were compared.

It was found that there was no difference in any of these parameters. The conclusion drawn is that PC-based computerised treatment planning system is cheap, more versatile, easily accessable and simple to operate and it is an ideal methods of treatment planning for the developing country, to better their existing facilities. The final and concluding RCA meeting is scheduled to be held in Korea 28-30 March, 1994 to finalize the recommendation for IAEA. The chief investigators of this project will represent the results in this final Research Coordination Meeting.

3. Agricultural Projects

Pakistan is conducting pilot scale studies on preservation of various food materials by gamma irradiation. We are in the process of formulating regulations for commercial food irradiation in Pakistan for which an IAEA expert visited Pakistan in May, 1992. The Agency is requested to consider provision of a commercial demonstration irradiator to Pakistan.

3.1 Food Irradiation Process Control and Acceptance (RPFI-III)

Experiments were conducted under the IAEA Research Contract on enhancing shelf-life of potatoes and onions, and decontamination of spices and poultry meat. A Final Research Co-ordination Meeting on the Asian Regional Cooperative Project on Food Irradiation with Emphasis on Process Control and Acceptance (RPFI Phase-III) held at Taejon, Republic of Korea from 20-24 September, 1993 was attended by the Principal Investigator of this project.

3.2 Utilization of Radiation-Induced Mutations and Somatic Cell Genetics for Development of New High-Tech Varieties of Food and Fibre Crops

Radiation Induced Mutations have played a vital role in developing new varieties of crop and plants. AEARC, Tandojam

is one of the centres of excellence of contemporary Mutation Breeding in the World. The proposed project envisages to combine Radiation and Chemical Mutagenesis in conjunction with Somatic Cell Genetics for solving the plant breeding problems of 21st century. This technology is being successfully used at this Centre with highly significant economic impact on our predominantly agricultural country.

3.3 Improvement of Grain Legume Rhizobium Symbiosis to Fix Atomspheric Nihoger

For the project on Improvement of Grain-Legume Rhizobium Symbiosis, it is suggested that studies on ecology of rhizobia and soil microflora using biotechnological tools as an important area be considered in future. The Principal Investigator of the Project attended Research Co-ordination Meeting held in Tamworth, Australia from 30 August to 3 September, 1993 and presented results of the experiments in this meeting.

4. Research Reactor Based Projects

Research Reactor Utilization:

A Project Formulation Meeting was held on RCA Project Research Reactor Utilization in Republic of Korea, 18-22 October,1993 and a presentation was made on Utilization of Research Reactors at PINSTECH, PARR-1 and PARR-2 by the Principal Investigator of the Project. The meeting recognized neutron beam research as an important area for research reactors utilization.

5. Energy Based Project

Energy and Nuclear Power Planning

National Co-ordination Network for the above RCA project was established during early 1993, although energy and nuclear power planning activity has been in existence for several years. A project formualation meeting on energy and nuclear power planning was held in Jakarta, Indonesia from 19-23 July, 1993,

in which Pakistan was also represented, to consider the needs and requirements for future regional efforts on this subject.

The meeting agreed that the first phase of this project had been useful in providing some regional experience in the use of methodology. The meeting identified three major areas of need for the future in the general field of energy, electricity and nuclear power planning. Very briefly these comprised:

(i) Need for further training courses in WASP, MAED & ENPEP
(ii) Input information for conducting energy and nuclear power planning analysis
(iii) Problems associated with the slow pace of implementation of nuclear power in the region.

The recommended future five year programme will be quite useful in meeting these needs.

6. Radiation Protection Project

This project is being carried out with the collaboration of IAEA to strengthen radiation protection infrastructure of the country. In this regard data collection of physical parameters i.e. height, weight, chest and head circumfrence of both sexes were made for all age groups ranging from 0, 5, 10, 15, 20-29, 30-39, 40-49 and 20-50 years. During this period data of 15,000 males/females were collected from various ecological areas of Pakistan. Statistical analysis was made on the total collected data of 45,000 subjects. The evaluated data on physical characteristics and food consumption status of reference Pakistani man for Asian countries was presented in Final Research Co-ordination Meeting of IAEA/RCA held at Tianjin, China from 21-29 October, 1993.

7. Other Comments

Pakistan is providing training to the scientists from the region at its Nuclear Institute for Agriculture & Biology (NIAB),

Faisalabad in agriculture and biology and would like to continue this cooperation so that other countries in the region could also avail this offer through TCDC. Pakistan is also keen to send its experts to the Member States for short duration as and when required.

Keeping in view the importance of Civil Engineering in the area of public welfare including soil investigation, materials testing, water resources management and sewerage engineering, Pakistan would like to propose that this area be given due importance under RCA programme.

In conclusion, Pakistan wishes to express its satisfaction on the implementation of various RCA activities so far. Pakistan fully supports RCA activities and has great desire to further promote regional cooperation in peaceful uses of nuclear energy. On behalf of Pakistan, I would like to thank the Government of Indonesia for hosting 16th RCA Working Group Meeting and we look forward to continued cooperation under RCA.

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PHILIPPINE STATEMENT
16TH WORKING GROUP MEETING
BALI, INDONESIA, 22-25 MARCH 1994

Mr. Chairman, I wish to extend my warm congratulations on your election as Chairman of the 16th Working Group Meeting of the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA).

I also wish to extend my appreciation for the excellent arrangements made by our hosts to ensure that our stay in this exotic island is both fruitful and memorable.

The presence of the IAEA Deputy Director General for Technical Cooperation and our very dynamic RCA Coordinator contributes to the assurance that this working group meeting will only serve to confirm the effectiveness of the network of cooperation fostered by the Regional Cooperative Agreement.

The Philippines, for the period under review, participated in twelve (12) projects. I now wish to present the highlights of our participation:

1. UNDP/RCA/IAEA Regional Project on the Use of Isotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development

1.1 Radiation Technology

1.1.1 Radiation Sterilization

a. PNRI and BFAD are working together towards the setting up of regulations on radiation sterilization. A Memorandum of Agreement between BFAD and PNRI is being finalized.

b. PNRI has completed and published rules and regulations on the licensing of large gamma irradiators.

c. R & D on radiation sterilization of medical products, pharmaceuticals, tissue and bone grafts are on-going. Some local manufacturers

in cooperation with PNRI have obtained clearances from BFAD to use irradiation for the sterilization of rubber surgical gloves

d. Industries are availing themselves of the gamma irradiation services of PNRI, for the radiation sterilization of empty aluminum tubes, sutures and gloves and for decontamination by radiation of empty gelatin capsules and spices.

1.1.2 Radiation Curing

a. A 1-week expert mission on UV curing of surface coating was requested and is scheduled on September 12 - 16, 1994. Also some chemicals for UV curing of surface coating were requested under the IAEA project PHI/8/013.

1.1.3 Electron Beam Treatment of Flue Gases

a. PNRI submitted a project proposal on Electron Beam Treatment of Flue Gases for IAEA 1995-1996 cycle. This project if approved will be implemented in cooperation with the National Power Corporation.

1.1.4 Radiation Vulcanization of Natural Rubber Latex

a. PNRI is continuing its R & D on radiation vulcanization of rubber latex.

1.2 Non-Destructive Testing

During the period under review, a total of 6 national training courses were conducted:2 UT-2, RT-1, UT-3 and 2 RT-2. Seventy four (74) participants took the course. The National Certifying Body (NCB) for NDT administered the NCB examinations: 7 examinees for UT level 3, 6 examinees for RT level 3, 10 examinees for UT level 2, 6 examinees for RT level 2, and 2 examinees for SM level 2.

1.4 Nuclear Analytical Techniques

A collaborative study with the Department of Environment and Natural Resources (DENR) on the analysis of air filters using nuclear techniques is on-going. This is done by XRF in the PNRI and will be done by NAA abroad by a PNRI staff on training.

One of the recommendations made at the 1st Meeting of National Coordinators held in Kuala Lumpur in June 1993 was that the Agency should consider the possibility of starting a new CRP on Applied Research on Air Pollution Using Nuclear-Related Analytical Techniques. Since this CRP will be useful to the country, the Philippines is interested to participate in the proposed CRP.

2. Medical and Biological Applications

2.1 Radioimmunoassay for Hepatitis B Diagnosis

The Philippines is participating in this project with the PNRI as the central & coordinating laboratory together with 4 hospitals as lead laboratories.

One hospital is working on children 0-5 years old who have been immunized against HBsAg, another on hospital workers, one on referred walk-in patients, the fourth hospital is working on referred walk-in patients to determine prevalence and assess infectivity among Hepatitis B carriers. It is considering study on blood donors depending on availability of personnel.

Comparative studies have been done by 1 hospital on the China kits using Abbott RIA for HBsAg, anti-HBs and anti-HBc. The rest were ran against ELISA reagents. Indices of these results have been calculated.

Another hospital ran the assays for HBsAg against RPHA and for anti HBs v.s. PHA and the rest were done as is. Calculation of the Youden index gave values of -.053 and -0.13 for HBsAg and antiHBs respectively.

Presently, as a result of the training course conducted in China in April 1993, the central laboratory, is now coating polyethylene beads with HBsAg and antiHBs supplied as bulk reagents by CIAE and is supplying the participating hospitals with HBsAg and anti-HBs reagents every 2 months. In addition, only 1 hospital is being suppliedwith HBeAg and anti-HBc kits directly from CIAE.

2.2 Inhalation Imaging for Diagnosis of Respiratory Diseases

The Philippines participated in the final coordination meeting of the Aerosol project held in India in December 1993. There was a general consensus during the meeting that the project should be further extended to establish direct correlation between pollution index in Asian cities to the incidence of respiratory diseases.

2.3 Radiation Sterilization of Tissue Grafts

Processing of freeze-dried irradiated allografts for packing of small tumors and for bridging small bone defects is being continued. An active staff of the Tissue Bank participated in the Regional (RCA) Workshop on Radiation Sterilization of Tissues: An Open Learning Programme, Vietnam, 15-26 Nov. 1993.

2.4 Imaging Procedures for Diagnosis of Liver Diseases (Phase III)

Results of the nuclear and ultrasound cases sent to different participating countries for interpretation of the nuclear medicine physicians and experts are still being awaited.

2.5 Radiation Therapy

For the past three years, the Philippines participated in the Regional Coordinated Research Project on Computer-Assisted Dosimetry in the Radiotherapy of Cancer of the Cervix. Cancer of the cervix is the third leading cause of cancer in the Philippines. The results of the research have been published in two local journals, the Nucleus and the Philippine Medical Association Journal. Computerized treatment planning has been shown to greatly improve the accuracy of treatment and dose calculations to various areas can be determined with minimum time & optimum effect. The Chief Scientific Investigator is attending the Final Research Coordination Meeting at Seoul, Korea on 28-31 March 1994.

2.5 Care and Maintenance of Nuclear Medical Equipment

Preparations for the Philippine hosting of the Regional Workshop on Protection of Nuclear Instruments, 2 -20 May 1994 were well underway when the Philippines received word early March 1994 that it had to be deferred due to unforeseen difficulties.

3.0 Radiation Protection

3.1 Radiation Protection Infrastructure

The Philippines participated in all the planned activities for 1993 such as the intercomparison of environmental radioactivity measurements, the regional workshop on the new ICRP 60 and the final coordination meeting of the Reference Asian Man.

Preparations for the conduct of National Train-the-Trainors Course in Radiation Protection in Industrial Radiography to be held in October are on-going. IAEA assistance in the form of experts will be requested.

As a result of the regional intercomparison of personal dosimeters concluded in 1992, the Philippines submitted a request for technical assistance to the Agency to strengthen the radiation protection infrastructure in the country (Phase I - Improvement of the Personnel Monitoring Services).

3.2 Compilation of Anatomical, Metabolic, and Physiological Characteristics of Reference Asian Man

The Philippines participated in the Final Coordination Meeting held in Tianjin, China last 25-29 October 1993 where a final report on the three (3) phases of the CRP was presented.

4.0 Agricultural Projects

4.1 Food Irradiation and Process Control and Acceptance

Results obtained on the irradiation of headless shell and head-on-shell products provide information on factors to control in the establishment of irradiation as a terminal decontamination process for frozen prawn.

4.2 Improvement of Grain Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen

Experiment on the quantification of N2 fixation in mungbean genotypes under field condition is being conducted in 2 different locations.

5.0 Research Reactor and Energy Based Project

The Philippines participates in this activity through a research contract.

IMPORTATION OF NUCLEONIC CONTROL SYSTEM IN THE PHILIPPINES
(As of October 1992 - March 1994)

Licensee	Level Gauge	Thickness Gauge	Basis Weight Gauge	Total Estimated Price
Asia Brewery (Laguna)	6			$ 300,000.00
Best Chemical & Plastic Grp.		1		$ 50,000.00
Del Monte Phils., Inc.	1			$ 50,000.00
Manila Paper Mills, Inc.		1		$ 300,000.00
Noah's Paper Mills, Inc.		1		$ 300,000.00
Paper City Corp. of the Phils.			2	$ 700,000.00
Pilipinas Shell, Inc.	4			$ 100,000.00
Plastech Industrial Corporation		1		$ 50,000.00
San Miguel Corp. (Mandaue)	4			$ 200,000.00
Sime Darby Pilipinas, Inc.		1		$ 383,000.00
Bataan Pulp and Paper Mills, Inc.			1	$ 350,000.00
Trust Int'l Paper Corporation			2	$ 700,000.00
Coca-Cola Bottlers Inc. (Antipolo)	1			$ 80,000.00
Coca-Cola Bottlers Inc. (Bulacan-Applicant)	2			$ 160,000.00
San Miguel Corporation (Polo Brewery)	1			$ 50,000.00
San Miguel Corporation (San Fernando Brewery)	4			$ 200,000.00
San Miguel Corporation (Bacolod Brewery)	2			$ 100,000.00
TOTAL	**25**	**5**	**5**	**$ 4,073,000.00**

16th RCA WORKING GROUP MEETING
BALI, INDONESIA, 22 - 25 MARCH 1994

COUNTRY STATEMENT : SINGAPORE

Participant : Assoc Professor Aziz Nather
Director, NUS Bone Bank
Head, Division of Spinal
Surgery, NUH
Singapore 0511

INTRODUCTION

Singapore is very pleased to be participating in this 16th RCA Working Group Meeting of IAEA. There was no participant to 15th RCA, 14th RCA Working Group Meeting of IAEA and indeed for many years before that.

Representation at this 16th Meeting marks the beginning of continuing participation in future RCA Working Group Meetings.

INVOLVEMENT WITH IAEA/RCA ACTIVITIES

Nevertheless, Singapore has always been very supportive and indeed strongly participating in many workshops and projects organized by IAEA/RCA. It is hoped that this continued participation will be of mutual benefit both to IAEA/RCA and to Singapore as well.

Singapore has contributed a great deal in the area of MEDICAL AND BIOLOGICAL APPLICATIONS:

1. RADIATION STERILIZATION OF GRAFT TISSUES BY GAMMA RADIATION

- represented by Assoc. Professor Aziz Nather for bone and ligament (locomotor) allografts. He is the Director of NUS Bone Bank set up since October 1988 currently processing both deep-frozen tissues stored at -80°C and lyophilized (freeze-dried) bones, gamma irradiated and stored at room temperature. Smaller bones are gamma irradiated in Physics Dept, NUS by Dr. Liew Soo Chin. Long bones are gamma irradiated at Nuclear Energy Unit, Komplek Puspati, Bangi, Selangor, Malaysia in collaboration with Dr. Norimah Yusof in Bangi. Professor Aziz is currently PAST PRESIDENT OF ASIA PACIFIC ASSOCIATION OF SURGICAL TISSUE BANKING.
- also represented by Mrs. BETTY FEI XUN for lyophilised (freeze - dried) amnion in Department of Clinical Research, Singapore General Hospital. She also runs a skin culture bank in SGH.

Plans are under way to set up a national tissue bank in SGH with Assoc. Prof. Aziz (Bone Bank) and Mrs. Betty Fei (Skin Bank). Feasibility study is being considered by IAEA and Ministry of Health, Singapore to improve more efficiently the use of both bone allografts and skin culture for all hospitals in Singapore in co-ordinator by the National Science and Technology Board.

2. DIAGNOSIS OF HEPATITIS B INFECTION BY RADIOIMMUNOASSAY
represented by Assoc PROF. AW TAR CHOON, Head, Department of Laboratory Medicine, National University Hospital.

3. RADIO-LABELED ANTIBODIES IN RADIO-IMMUNODIAGNOSIS
represented by DR. SUNDRAM F. X., Department of Nuclear Medicine, Singapore General Hospital.

Singapore has participated in the following workshop:

i) Regional (RCA) Training Course on the Preparation of Basic Reagents for the RIA of Hepatitis B Markers.
China Institute of Atomic Energy, Beijing, China, 26 April - 7 May 1993
Ms. Elizabeth Ling L. S., Clinical Chemistry, Dept. of Laboratory Medicine, National University Hospital.

ii) Regional (RCA) Workshop on Total Quality Systems for Tissue Banking of Radiation - Sterilized Surgical Grafts
Tissue Banking Centre, Centre for Application of Isotopes and Radiation, National Atomic Energy Agency (CAIR-Batan)
2-13 August 1993
Mrs. Betty Fei Xun, Department of Clinical Research Singapore General Hospital.

iii) Regional (RCA) Workshop on Radiation Sterilization of Tissue: An Open Learning Programme
Ho Chi Minh City, Vietnam
15-26 November 1993
a) Assoc. Prof. Aziz Nather, Director NUS Bone Bank, National University Hospital, Department of Orthopedic Surgery.

b) Mr. Yong Soon Chiong, Technician-in-charge of NUS Bone Bank, National university Hospital, Department of Arthopedic Surgery.

iv) Regional (RCA) Workshop on Trouble Shooting and Report of Gamma Cameras
Bombay, India
30 Aug - 24 Sep 1993
Mr. Roslee bin Abdul Jalil, Singapore General Hospital

v) CRP on Aerosol Inhalation Imaging for The Diagnosis of Respiratory Diseases in Developing Countries.
Bombay, India
9-11 December 1993
Dr. Sundram F. X, Department of Nuclear medicine, Singapore General Hospital

DEVELOPMENTS IN MEDICAL AND BIOLOGICAL APPLICATIONS

Just as the SKIN BANK is developed as a NATIONAL SKIN CULTURE BANK in Singapore General Hospital, recently a research grant has been awarded to the NUS Bone Bank to upgrade the facilities as a NATIONAL BONE BANK under Assoc. Professor Aziz Nather in National University Hospital (Grant given in January 1994 by Totalisator Board/Ministry of Health). Prof. Aziz has been instrumental in the development of Asia Pacific Association of Surgical Tissue Banks (APASTB) being its First Vice President (1988 - 1990), its President (1990 - 1992) and currently its Immediate Past President (1993-1994). He is now part of APASTB working group to organize a combined meeting with EATB and AATB.

He has been invited to deliver a lecture "Current Status of Bone Banking in Singapore in the 5th meeting of APASTB in Suzhou, China, 15-17 June 1994.

Prof. Aziz has applied to attend the Regional Training Course on Open Learning Techniques Applied to Radiation Sterilization for Tissue Grafts in conjunction with the APASTB Meeting in Suzhou, China, 13-24 June 1994.

AGRICULTURAL

The status in Singapore will be reported in future meetings. There is not much application in this field however.

RADIATION PROTECTION

The position and involvement by Singapore will be collated and reported perhaps at the next RCA Meeting.

INDUSTRIAL AND ENVIRONMENTAL APPLICATIONS

Again the status and involvement by Singapore will be collated and reported at the next RCA meeting bearing in mind that this is the first time Singapore is participating in a RCA Meeting.

ASSOC. PROFESSOR AZIZ NATHER
PARTICIPANT, SINGAPORE
16TH RCA WORKING GROUP MEETING
IAEA

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SIXTEENTH RCA WORKING GROUP MEETING
BALI, INDONESIA, 22-25 MARCH 1994

COUNTRY STATEMENT - SRI LANKA

Mr. Chairman, distinguished delegates and other participants.

Please accept my congratulations Mr. Chairman, on your selection to the Chairmanship of this 16th RCA Working Group Meeting. I also wish to express the appreciation of the Government of Sri Lanka to the Government of the Indonesia for hosting this meeting.

Sri Lanka which has been a party to RCA since 1972, notes with satisfaction the success which regional co-operation has achieved in meeting the goals of the RCA to promote and co-ordinate co-operative research, development, and training projects in nuclear science and technology through the sharing of regional resources, including facilities, equipment and expertise, and the pooling of knowledge and close communication between scientists. Sri Lanka has benefitted from RCA activities in a number of areas by way of awareness, development of skilled manpower and application of knowledge to the solution of national problems. I wish to express our gratitude to the IAEA, UNDP, donor countries, national institutes and co-ordinators in RCA Countries and all others who have contributed to the success of the RCA.

It is the declared policy of the Government of Sri Lanka to give highest priority to sustainable development programmes which will bring about improvements in the economic and social conditions, and the quality of life of our people without environmental degradation. The Government has recognized that the proper application of modern science and technology, including Nuclear Science and Technology is essential for achieving its stated objectives.

INDUSTRIAL APPLICATIONS

Sri Lanka, which benefitted considerably under the former UNDP/RCA/IAEA Industrial Application project is planning further developments under the new UNDP/RCA/IAEA project on the use of Radioisotopes and Radiation to Strengthen Technology and Support Environmentally Sustainable Development.

In NDT technology, Sri Lanka plans to develop the capability of providing local training at level 3. It will participate in the regional proficiency testing programme.

Sri Lanka has made considerable headway in radiation vulcanization of natural rubber latex. Two tons of processed rubber latex which was irradiated in Indonesia, was used for manufacturing examination gloves in a local factory. This production trial was very successful and the Atomic Energy Authority is taking steps to promote this process so that it can be commercialized. Sri Lanka thanks the Government of Indonesia for its co-operation.

In the area of Nuclear Analytical Techniques, a National Committee has been established and two members have been trained in regional workshops. Sri Lanka will be participating in the new CRP on air pollution.

A National Tracer Group has also been established under the new UNDP project. The high cost of isotopes has become a drawback in introducing this technology on a wider scale. Sri Lanka supports the new project, Applied Research on Air Pollution using Nuclear Related Analytical Techniques.

MEDICAL APPLICATIONS

Medical applications have been among the more successful nuclear activities in Sri Lanka. IAEA technical assistance has been provided to several medical centres including the Government Cancer Institute, National Blood Bank, Colombo General Hospital and the Medical Faculties of the Peradeya and Ruhuna Universities to upgrade and modernize the existing nuclear medicine facilities and to establish new ones. These include the development of RIA facilities for in-vitro diagnosis, the establishment of computer supported Gamma camera equipment for in-vivo diagnostic imaging, and the improvement of radiation therapy for cancer patients by the introduction of a high dose rate Co-60 Brachy-therapy system.

Sri Lanka will be setting up a Tissue Bank with the assistance provided by the IAEA under the Model Project programme. The first long bone transplant using a bone from a cadaver was carried out recently. The bone was sterilized by irradiation in Thailand, and I wish to express our appreciation to the Government of Thailand. Sri Lanka participated in the RCA project on Radiation Sterilization of Tissue Grafts which will contribute towards the implementation of the Model Project on Tissue Banking.

Sri Lanka is using RIA for screening of donor blood for Hepatitis B and is a participant of the RCA project on Diagnosis of Hepatitis B by RIA. The Project Co-

ordinators Meeting was held in Colombo, Sri Lanka in 1993. Sri Lanka welcomes the focus on the local production of primary reagents. Sri Lanka is a participant of the RCA project on maintenance of nuclear instruments. A centre has been established for maintenance of nuclear instruments.

Sri Lanka also participated in the CRP on Computer Assisted Planning and Dosimetry in Radiotherapy of Carcinoma of the Cervix, the final RCM of which will be held in Korea this month.

Sri Lanka supports the new project proposal on Air Pollution and Lung Functions.

FOOD AND AGRICULTURE

Under the RCA project on Food Irradiation, microbiological studies on irradiated commodities have been carried out, to determine the total mesophilic count, coliform count and fungal count. Studies are being conducted to obtain consumer reaction to irradiated food.

The RCA project on Grain Legume and Rhizobium Symbiosis is an important activity for Sri Lanka because of the need to enhance biological nitrogen fixation by field crops. This will help to reduce dependence on expensive inorganic nitrogen fertilizers.

Out of the new project proposals, Sri Lanka wishes to record, Increasing Crop Yields through Agroforestry, Induced Mutations for Improvement of Crops and the Establishment of a Regional Rinder pest Monitoring network as priority ares.

RADIATION PROTECTION

Sri Lanka places high priority on development of infrastructure for radiation protection activities as this is an essential pre-requisite for all nuclear related projects. A workshop on radiation protection for medical physicists, technicians and nurses, was held in 1991 with IAEA assistance. A training exercise on quality control of X-ray machines for reduction of patient dose was conducted in 1993 and a workshop for medical scientists was conducted in 1993 and a workshop for medical scientists was held this year. Several training programmes have been conducted for industrial users.

ENERGY BASED PROJECTS

A number of persons from the Ceylon Electricity Board have been trained on the use of WASP which is being used now by the Generation Planning Branch of the CEB. Sri Lanka supports the continuation of this activity.

Finally Mr. Chairman, we wish to reiterate our appreciation to the Government of Indonesia for hosting this meeting, for the excellent arrangements and lavish hospitality.

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COUNTRY STATEMENT – THAILAND
16TH RCA WORKING GROUP MEETING
22–24 MARCH 1994, BALI, INDONESIA

Mr. Chairman,

First of all, let me congratulate you, on behalf of the Thai delegation, on your unanimous election as the Chairman of the sixteenth RCA Working Group Meeting.

Mr. Chairman,
Distinguished Delegates,

I would like to express my deepest gratitude to RCA, UNDP and IAEA for their strong and continued support enabling the expansion of peaceful uses of nuclear technology to all RCA member states throughout the past years. I would also like to extend my sincere appreciation to the Government of Indonesia for their kindness in hosting the meeting with excellent arrangement and warmest hospitality. It is my great pleasure to participate in this important meeting and have an opportunity to meet with all other delegates of RCA member states.

Since the last meeting in Manila, The RCA activities in Thailand has gone through a series of progresses in the following endeavors.

1. REGIONAL INDUSTRIAL AND ENVIRONMENTAL PROJECT

1.1 Tracer Technology

The national executive management seminar and field demonstration(NEMS) on the Application of radiotracer in industry, held at the Gas Plant, the Petroleum Authority of Thailand, Map Ta Phud Industrial Estate, Rayong during August 9-13, 1993 was successful. There were 24 participants, from a university, 2 state enterprise companies and 8 private companies. Lectures and laboratory demonstrations were conducted by the IAEA experts (Dr.J.S.Chalton and Mr.Harder) and some OAEP staffs. The on-line Gamma Scanning technique was applied to inspect for trouble shooting in a stabilizer column of a refinery plant on August 10 and flooding at tray No.10 was clearly indicated. When the unit shut down on August 13, some metallic scales and broom strands debris were found inside the down comers bottom outlet of the tray.

Technology transfer both to the tracer group and industrial sector was also obtained by the visit of Dr.Jiri Thyn in October 1993. This includes Tracer Techniques, Tomography and Column Scanning.

The column scanning technique was frequently applied to serve several petroleum and petrochemical industries for the inspections of the facilities' functioning. Abnormal performances in four of the twelve units were clearly identified.

Though the promotion of technology to petroleum and petrochemical industry through a series of national seminars has been successful,this activity will be continued in 1994 for more details concerning the process optimization purposes. The promotion of the technology to other applications, such as coastal engineer and other industries, eg. chemical,paper,cement,is also planned.To achieve the objectives of the plan, assistance from long term experts,short term experts, and fellowship training should be available.

1.2 Nucleonic Control System(NCS)

Thailand has been selected to be the training and demonstration center for the use of NCS in coal processing at the Mae Moh Mine,the Electric Generating Authority of Thailand(EGAT). This activity in 1993 has been postponed to November 1994. The current status is still in calibration of the equipment which has been carried out by the supplier's engineer with collaboration and advice of project's experts.OAEP has played a role as co-ordinator for this activity.

There were some obstacles in man power development due to government policy:-the zero growth for new scientist & engineer in the governmental organization. Currently,the working staff now existing is not enough to fulfil the needs from the industries. To get more recruitment in the near future,the attemption is being made for the government understanding how important the nuclear technology is for the development of industries in Thailand.

The other problem regarding the brain drain also occurred in 1993. Mr.Pipop Thamthalai and Ms.Jindarom Chavacharoenpun ,the ex-national co-ordinator on Tracer Technology & Nucleonic Control System and Radiation Technology took leave for the other jobs.OAEP had to appoint the other scientists,Mr. Siripone Chue-inta and Mr.Manit Sonsuk to handle the tasks.

1.3 Non-Destructive Testing(NDT)

OAEP,with the cooperation of Thai Society for Non destructive Testing(TSNT) has serviced NDT technology transfer to private sectors via the national training courses emphasizing on the specific and complicated works.In 1993 seven training courses in RT I,RT II and UT II, were organized. Ninety engineers and technicians from the government agencies,state enterprises and private sector personnel were certified.

Recently requested by the RCA co-ordinator, OAEP is pleased and honoured to provide office and facility for station of one and half years expert since 1994. We realize that the expert assistance in promotion of nuclear technology in this region will be very valuable.

1.4 Radiation Technology

1.4.1 Radiation Vulcanization of Natural Rubber Latex(RVNRL)

In 1993, a study of graft polymer by gamma irradiation of natural rubber latex (NRL) and methyl methacrylate (MMA) was conducted for the purpose of producing thermoplastic elastomer(TPE) and producing natural rubber adhesive. The optimum conditions to obtain the TPE were found to be : 40% DRC of NRL mixed with 50 phr MMA in presence of 5 phr carbon tetrachloride(CCl_4) and 0.5 phr oleic acid. The dose required was 5 kGy. As for adhesive property of the irradiated product, latex adhesive from this study showed higher peel strength for polar articles with non-polar articles than that from chloroprene adhesive.

To reduce irradiation cost,vulcanization dose should be reduced to a much lower value.Modification of the sensitizer system eg. acrylate with hydrogenperoxide which require half a vulcanization dose of using acrylate alone,is being studied.

The national workshop on RVNRL will be organized in Bangkok during may,9-10,1994.

1.4.2 Radiation Treatment of Sewage Sludge

R&D in radiation treatment of sewage sludge has been carried out in many aspects namely:

Radiation disinfection effect of pathogens and parasites, radiation sensitivities of some serotype of salmonella in sludge samples both in dewatered and liquid forms were investigated.

Upgrading of irradiated sludge,the survey of some useful micro organisms in upgrading of the irradiated sludge to be further used for biological control of plant pathogens as well as animal feed was studied.

Evaluation of the sludge' components, eg. the analysis of some major and miner nutrients and trace elements which are essential for plant growth was studied.

The feasibility study on the establishment of a pilot radiation treatment plant will be carried out.

1.4.3 Radiation Sterilization

The radiation sterilization of medical products and devices, commercialized in 1984, has been popular ever since. The demand is increasing significantly. However, the appropriate regulatory control for the justification of such medical devices and to assure the public confidence is still lacking. Accordingly,the Good Manufacturing Practices(GMP) for the medical devices control is being prepared by the Medical Service Control Division of the Food and Drug Administration of Thailand.In the meantime, the GMP regulation for pharmaceutical products is temporary applied.

The regional training courses on Radiation Sterilization with emphasis on the quality control and application of ISO standard will be held at OAEP on July 1-15,1994.

1.4.4 Radiation Curing

Many printing factories in Thailand are now using the UV processing. Currently,the Department of Photographic Science and Printing Technology,Chulalongkorn University is conducting R&D in this field.Bachelor degree in Packing Science and short summer courses are being offered to the public.

The International Conference in Radiation Curing(RadTech Asia'95) is to be held in Thailand in 1995.

1.5 Nuclear Analytical Techniques

Two OAEP's scientists working on environmental pollution studies by nuclear techniques attended a Regional Workshop on Environmental and Industrial Applications of Nuclear Techniques which was held in India during January 24-February 11,1994. Respectively,a fellowship training on the Application on Nuclear Techniques in Material Sciences is being applied.

2. MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNIQUES

2.1 Radioimmunoassay for Hepatitis B Diagnosis

The 242 Hepatitis B markers(RIA kits) received from China via the IAEA during March 1992-March 1993 were distributed to the three participating laboratories of the Chulalongkorn Hospital and the National Blood Center of Thai Red Cross Society. A total of 4,117 cases of the studied populations could be classified into 5 groups namely: healthy persons,blood donors,pregnant women,HBV carriers & families and high risk children.The reliability of these RIA kits was also evaluated by comparing the performance of all HBV markers with EIA kits from Abbott in 584 subjects in the group of carriers and families.Most markers had fairly high sensitivity and specificity.However, false positive ranges of 4.4-9.4 % were also obtained.

2.2 Radiation Sterilization of Biological Tissue Grafts

The tissue banking process comprises of donor selection, tissue procurement,preservation,packaging,sterilization and quality control.

Since 1985,the Bangkok Biomaterial Center(BBC) of the Orthopaedic Department,Siriraj Hospital has procured totally 13,500 bone and tissue allografts from 336 donors for the treatment of 1,062 patients in 43 hospitals in Thailand. From these figures,the totally 85 irradiation sterilizations were done by Thai Irradiation Center(TIC) and Gamatron Co. Ltd.

In 1990,the Donor society for bone and tissue allograft of Thailand was organized.At present there are totally 131 voluntary registrations.

Only in 1993, there were 903 procurements from 21 donors for the treatment of 101 patients. There were several special cases of utilization including Mr.Nguyen Cong Chuy,an official from Vietnam

who had suffered from Giant cell tumor at the upper end of his left femur for many years. When he was admitted in Siriraj hospital in Bangkok on September,9,1993,he could not walk at all. The surgery for the bone allograft composite replacement was successful. At the present he is healthy and start walking again.

Moreover, on September 28,1993, The TIC received an urgent request from Sri Lanka International Eye Bank to irradiate two bags of bones to save the leg of a young lady. The bones were then delivered to TIC by the TNT Express Co. on October 5,1993. After simultaneously irradiated in the same day for the minimum absorbed dose of 25 kGy, they were sent back to Sri Lanka on the next day. We were latterly informed that the bones arrived Sri Lanka in good condition.

In the visit of Dr.Phillips,an IAEA expert in September 1993, BBC was recommended to be the Training center for tissue banking in this region. In 1994,a master degree curriculum on this subject is founded at Mahidol University. This will fulfil the need for the well-trained personnel in the near future.

Some assistances have also been asked from the IAEA for the expansion of the work since last year. These include a one gallon size gamma source,bone densitometer,high temperature furnace and the bone laser surgical equipment.

Recently,there has been the invitation from The Sri Lanka International Eye Bank for Dr.Yongyudh Vajaradul to visit Colombo to do some surgery on injured soldiers and to demonstrate the use of donor allograft bones.

3. AGRICULTURAL PROJECTS

3.1 Food Irradiation Process Control and Acceptance (RPRI III). Control of Rice and Mungbean Irradiation Processing and Market Trial

More development following the successful research work in 1992 - the improvement of the product loading efficiency and the optimization of the product throughput in irradiation processing of rice and mungbean,using the carrier type gamma irradiator model JS-8900 of the Thai Irradiation Center (TIC), the market testing and consumer acceptance of those irradiated rice and green mungbean has been carried out in 1993. One kilogram package of a special grade A regular white rice of 13 % moisture content in the polyethylene bag was irradiated at a minimum dose of 0.5 kGy. Four hundred and sixty kilograms of the rice were introduced to 20 volunteer consumers and a local store in Bangkok.Based on the response to the questionnaire,all consumer were interested in trying the irradiated rice for its better quality and infestation free but forty percent of them did not want to spend extra money for the irradiated rice. All the consumers also preferred radiation to toxic chemical disinfestation method, if they have a choice.

Special grade A of green mungbean,with 9% moisture content in 1 Kg package each was irradiated at a minimum absorbed dose of 0.5 kGy and used for market testing. Although the quality of the irradiated green mungbean was acceptable, the market testing was unsuccessful due to 1 kg package was too large for a single use,not suitable for planting bean sprout,expensive and not a staple food.

Further development on market testing and consumer acceptance of the irradiated rice and mungbean, based on the consumers advise eg. the larger package of rice (5 kg each regular white rice) and the smaller package of mungbean (300-500 gm.), will be continued.

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

The research work entitled " Screening with Nuclear and other Techniques for Yield and N_2 Fixation in Mungbean " has been carried out in Thailand since 1989. The objective was to select mungbean lines and rhizobium strains for high nitrogen fixation. Results obtained from screening of 423 mungbean lines indicated that some mungbean lines eg. VC 1776,VC 3182,VC 1830 VC1693 and VC2335 were higher in nitrogen fixation than the recommended cultivars. Using ^{15}N natural abundance technique to quantify the amount of nitrogen fixed found that mungbean line fixed nitrogen ranging from 0-300 mg per plant for 35 days. It was interesting to find that the hybrid line F7 of VC2768 A/1560 D which was the highest fixing line could fix N up to 19.2 kg per rai. The farmer could save 235-300 bath per rai when using this line. Under normal field condition the selected mungbean line could fix N up to 70%. It was also found that most mungbean rhizobia were effective and sorghum was the outmost suitable reference plant for measuring N_2 fixation in mungbean.

4. RESEARCH REACTOR,ENERGY BASED AND GENERAL PROJECTS

4.1 Research Reactor Utilization

In phase I, OAEP has participated through the research contract entitled" Program Package for 2D Burnup Calculation". At present,all the programs including subroutine and libraries have been completed and tested to run separately. Automatic connection is in progress. The results of calculation will be verified by comparing with the measured data from the log book of reactor operation.

Apart from this activity,in 1993, some workshop/training courses were attended by OAEP staffs, eg. Applied Aspects of Neutron Scattering,Nuclear Methods in Materials Development and Calculation and Measurement of Neutron Flux Spectrum for Research Reactor.

The second Research Coordination Meeting on Application of Personal Computers to Enhance Operation & Management of Research Reactors was also held in Bangkok during May 24-28,1993.

4.2 Energy and Nuclear Power Planning.

Consumers expectation and economic development require reliable supply of electricity. To meet this need,the development planning process considers: project demand over a planning period of at least 12-15 years,available energy sources and alternative means of meeting the demand growth. At the Electrical Generating Authority of Thailand(EGAT), alternative generation expansion sequences are analyzed using a package of computer model (WIGPLAN). This involves some generation planning criteria and assumptions such as reserved and reliability criteria etc.

The power demand in Thailand has been observed as about 1,000 MW per year or 10% increasing. In 1993, the total generation capacity requirement was 8.876 MW. The supply options could be classified by the fuel types as 6.2% hydro power,45.4% natural gas,23.7% heavy oil,23.4% Lignite and 1.3% electricity imported from the neighbors.

In 2006 ,according to the EGAT Power Development Plan following the eight National Economic and Social Development Plan period(1997-2001),the first nuclear power plant of 1000 MW has been proposed as a candidate among the other options of the thermal power plant projects. There are still a number of issues to be considered for the final decision by the government namely; safety,economic, waste disposal, human resources,regulatory framework and public acceptance.

Furthermore,a successful nuclear power program requires a solid supporting infrastructure particularly,training,education, engineering capability and regulatory framework. In order to make the regulatory body independent,the regulatory work and R&D work of OAEP are to be separated.

During July,19-23,1993, the co-ordinator attended the project formulation meeting on this subject in Indonesia.

5. RADIATION PROTECTION PROJECTS

5.1 Radiation Protection Infrastructures

In 1993,OAEP organized a number of national training courses on Radiation Protection Level I and Level II.Hundreds of the participants were scientists ,medical staffs and engineers from various institutes.

During February,21-25,1994, a representative from OAEP attended the IAEA/RCA Expert Meeting on Intercomparison of Radioactivity Measurement for Environmental Samples. According to this, Japan,as a host country, will prepare some environmental samples and distribute them to other participants via the IAEA.

There will be a joint IAEA/OAEP National Training Course on Radiological Emergency Planning and Preparedness during May,6-20 1994. The objectives of the training course are to enable the radiation protection officers in various institute in Thailand to be acquainted with the recently established code of practices on

the Emergency Planning and Preparedness for Accidents involving Radioactive Materials Used in Medicine,Industry,Research and Teaching as well as to be well prepared for handling the emergency situation. About 20 participants are expected to attend the course.

5.2 Reference Asia Man

Though Thailand did not joint this project,some in-house activities were carried out in 1993.The R&D on the Studies Physiological Data,by a medical staffs in Chiengmai,has reached 35% of the project's proposals. The other study,the Organ Mass by Autopsy will latterly be organized in 1994.

CONCLUSION

On the regional basis,RCA cooperation,through various programs and projects, has provided a valuable opportunity to maximize the welfare of the people.Its benefits have been shared by 15 countries in the region. It is gratifying to note that these benefits has been increasing both absolutely and relatively. Thailand is happy and proud to share with all of RCA member states various innovative approaches that have been initiated for further expansion of the activities to ensure the prosperity of the country and the region.

COUNTRY STATEMENT OF VIETNAM

The 16th RCA Working Group Meeting
Bali, Indonesia, 22 - 25 March 1994

Mr. Chairman,
Distinguished delegates,
Ladies and Gentlemen,

Vietnam is very happy to participate in this 16th Working Group Meeting of RCA Member States being held in Bali, a famous tourist resort of Indonesia, and would like to express our gratitude to the Government of Indonesia for hosting this meeting with the warm hospitality.

Vietnam would like to express the deepest gratitude to RCA, UNDP and IAEA for their strong support enabling the expansion of peaceful uses of nuclear technology to all RCA Member States throughout the past years. We wish to express appreciation to donor countries in the region, without which the RCA would not have achieved much of its accomplishments. We hope that they will continue and increase their support to the RCA programme.

Since the last meeting in Manila, the RCA activities in Vietnam has gone through a series of progresses in the following endeavours.

I. INDUSTRIAL APPLICATIONS

Vietnam highly appreciates UNDP, IAEA and the donor countries of Australia and Japan for their supporting and funding the Industrial Project, that made the first year , 1993, of the project's implementation successful. As a project beneficiary, the following activities have been done in the scope of the project :

1. Tracer Technology

Two main tracer groups in Dalat and Hochiminh City have carried out the investigations on sediment transportation and water movement. Surveys on sediment movement at Haiphong port have been accomplished by the Dalat tracer group incorporated with on-going TC project VIE/8/007. Under a state-funded project, the tracer group in Dalat is able to produce glass labelled with radiotracers, instrument for tracer injection and containers for radioisotope transportation. The tracer group in Hochiminh City with using I-131 radiotracers has obtained preliminary results on damp leakage study from Tri An water reservoir and on determination of underground water movement in Vinh Long and Tra Vinh provinces. This group has also accomplished the study on soil moisture movement in two unsaturated zones located near Hochiminh City with application of I-131 tracers.

2. Radiation Technology

a. Radiation vulcanization of natural rubber latex

In 1992 about 1.8 ton latex were sent to CAIR-BATAN, Indonesia, for gamma irradiation. In 1993 irradiated latex was used for trial producing surgical gloves and other products in several medical rubber factories of Hochiminh City and it showed appropriate quality. A National Seminar on radiation vulcanization of natural rubber latex , held in Hochiminh City, June 1993, involved all leading rubber latex manufacturers.

b. Activities of the Hanoi irradiation facility.

The Hanoi irradiation facility, in the first year of its operation, was used for food preservation research and a number of tests for other industrial applications: More than 4000 tissue grafts have been sterilized; sterilization of peat based carrier for testing production of nitrogen fixation fertilizer applied to more than 3000 hectares of cereal and legume; insect and microbial control for traditional pharmaceuticals and raw materials (medicinal herbs, tobacco leaves, bamboo articles).

3. Non-Destructive Testing

Two national training courses were held in 1993 on UT level 1 and level 2 with 36 participants. R & D on Non-Destructive Testing of non-metallic materials, specially concrete constructions, were developed in 1993 incorporated with a new TC project VIE/8/009. Requests on NDT in civil engineering were increased in 1993.

4. Nucleonic Control System

Three NCS groups in Hochiminh City, Dalat and Hanoi have maintained, repaired and renovated NCS's systems in some local industrial factories (cement, paper and beverage). The NCS group in Hanoi has applied coal ash gauges in Hong Gai mines.

5. Nuclear Analytical Techniques

Vietam highly appreciates the initiative of introducing this sub-project into the RCA Industrial Project with the aim of using Nuclear Analytical Techniques for environmental studies. Vietnam has sent a national co-ordinator to participate in the first national co-ordinators meeting held in Kuala Lumpur, Malaysia, in June 1993.

Since 1980's years a programme has been initiated in Vietnam for developing the applications of Nuclear Analytical Techniques (NAT) in industry, natural resources exploration, agriculture, medicine, environmental research and monitoring. In the field of environmental research and monitoring, the main activities were as follows:

a. Application of NAT with high sensitivity and capability for multi-element analyses to obtain the base line data on the concentration of toxic elements and radionuclides in environmental objects.

b. Determination of element (macro- and micro-) concentrations in soil, plants, water, foods, etc. in supporting the sustainable development of agriculture and improving the quality of life.

c. Use of environmental isotopes as indicators to study processes in the atmosphere and in the hydrosphere.

II. NUCLEAR MEDICINE

In 1993 four new Nuclear Medicine Departments (NMD) have been established in provincial hospitals of Vietnam. It results that at present there are 16 NMD in Vietnam. A national meeting on nuclear medicine was organized by VINATOM for improvement of coordination of activities in Vietnam. Fast development of Nuclear Medicine in Vietnam raises a question of training and radiation protection in the medical sector. In 1993 an amount of Vietnamese specialists have got training under the IAEA and RCA projects. We hope that in the future more specialists from the sector will get training.

In framework of the project RAS/6/018 the kits received have been used for classifying blood donors from those infected with hepatitis B virus, detection of Hepatitis B virus in patients suffering liver diseases and surveys on Hepatitis B epidemiology. In 1993 RIA kits delivery was much improved. However we have been facing the lack of HBe-Ag / AntiHBe kits, which were very much needed in Vietnam.

Project RAS/7/003 for radiation sterilization of biological tissue grafts was one of the most successful projects in Vietnam in 1993. During the year a National Seminar on Tissue Graft was held by VINATOM and Vietnam has hosted a Regional workshop on open learning in radiation sterilization of tissues in Hochiminh City in November 1993. For two years 1992 - 1993 about 8,500 units of tissue grafts were sterilized in Hanoi irradiation facility and Dalat research Co-60 source. They have been applied for clinical treatment for about 500 patients in 16 hospitals in the country and have been positively estimated.

Under project RAS/4/008 activities of Vietnam in 1993 were concentrated in training personnel and maintenance and repair of nuclear instruments. We hope that with a technical assistance from RCA and IAEA in the coming period the old gamma cameras and other nuclear instruments in Vietnam will be repaired and upgraded. This is a great contribution to the development of nuclear medicine in Vietnam. Vietnam supports RCA programme on QA & QC in Nuclear Medicine.

Vietnam supports new project proposals in nuclear medicine and calls on RCA States and the Agency to get them approved.

III. RADIATION PROTECTION

In 1993 the Radiation Protection Infrastructure of Vietnam has got significant progress. A National system of Radiation Protection and Nuclear Safety was underway to be shaped. A State Decree of Radiation Protection is being drafted and in the process of passing through the National Assembly. A National Training Course on Radiation Protection and Nuclear Safety was organized by VINATOM. A NTC on Radiation Protection Licensing and Nuclear Inspectors was held in Hanoi under VIE/9/004 project.

Concerning the project RAS/9/006, Vietnam has participated in the regional programmes on Intercomparison of Personal Dosimeters, and Compilation of Anatomical, Physical and Metabolic Reference for Asian Man.

IV. FOOD AND AGRICULTURE

1. Project RAS/89/044 , RAS/5/020 "Food Irradiation Process Control and Acceptance". Hanoi Irradiation Center has carried out a pilot scale irradiation practice for onion, rice, etc. A lab-scale trial on inhibiting bananas from getting ripe was carried out, whose results permitted to plan further tests on pilot scale.

2. Project RAS/89/045 , RAS/5/021 "Improvement of Grain-legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen". A RC has been implemented in Hanoi University and some results were obtained.

V. RESEARCH REACTOR AND ENERGY BASED PROJECTS

In 1993 the Dalat nuclear research reactor has been under a general maintenance and upgrading of its technological system. The control system of the reactor was renovated with a technical assistance from Agency under project VIE/4/010. In the second half of 1993 the Dalat reactor was effectively exploited with 100 hours continuously at work after every 3 weeks.

Vietnam's experience in radioisotope production has been exchanged within RCA countries (Philippines and Thailand).

With the only research reactor Vietnam has improved its utilization and operational safety. Vietnamese scientists, who have got training from IAEA and RCA, have been carrying out the reactor refurbishment by themselves.

Vietnam has got benefits from implementing project RAS/0/013, particularly in manpower development. There have been done such works as updating data for WASP-III programme, getting used to MAED, VALORAGUA, MICROCOSM.

VI. CONCLUSION

Vietnam would like to express its satisfaction with the implementation of various RCA activities and has great desire to further promote regional cooperation in peaceful use of nuclear energy. We are very pleased to note that Vietnam has taken great benefit through the various activities under the RCA programme during past years. Vietnam would like to appreciate the Agency, UNDP and the donor countries for funding and supporting the RCA activities.

Finally, we wish to reiterate our appreciation to the Government of Indonesia for hosting this meeting, for the excellent arrangements and the warm hospitality.

Annex 38

RCA ACTION PLAN 1994

Field	Project	Technical Officer	Project No.
Medical and Biological	Use of Computers in Tc-99m Imaging	A. Cuaron	RAS/6/016
	Radiation Sterilization of Tissue Grafts	R. Mukherjee	RAS/7/003 E3.10.04
	Radioimmunoassay for Hepatitis B Diagnosis	R. Piyasena	RAS/6/018
	Care and Maintenance of Nuclear Medical Equipment	Y. Xie	RAS/4/008 E1.10.06 E1.10.07
	Strengthening of Nuclear Medicine in RCA Member States	T. Yamasaki	RAS/6/022
Industry	Regional Project for Asia and the Pacific (RCA) on "Environmentally sound Technologies"	J.F. Easey (Project Officer)	RAS/8/068 RAS/8/069 RAS/8/070 RAS/8/071 (RAS/92/073)
	Sub-projects:		
	- Tracer Technology in Industry	B. Zatolokin	
	- Non-Destructive Testing	B. Zatolokin	
	- Radiation Technology	V. Markovic	
	- Nucleonic Control Systems	to be nominated	
	- Nuclear Analytical Techniques	R. Parr	

RCA ACTION PLAN 1994

Field	Project	Technical Officer	Project No.
Agriculture	Increasing the Yield and Nitrogen Fixation Capabilites of Common Grain Legumes	S. Danso	RAS/89/045 (UNDP) RAS/5/021
Radiation Protection	Strengthening of Radiation Protection	P. Strohal	RAS/9/006
	Activities: - Intercomparison of Radioactivity Measurement	J. La Rosa	
	- CRP: Reference Asian Man	R. Griffith	J3.20.01
General	Research Reactor Utilization Including Basic Science Using Research Reactors	K. Akhtar	RAS/4/011 F1.20.09
	Energy and Nuclear Power Planning	P. Molina	RAS/0/013
	Nuclear Information System	Selma Chi Barreiro	RAS/0/019
	Development of TCDC in Asia and the Pacific	J.F. Easey (Project Officer)	RAS/0/015

RCA BUDGET AND BUDGET ESTIMATES FOR 1994*

Project No.	Title	Fund Source	BUDGET US $k 1994
RAS/0/013	Energy and Nuclear Power Planning	TC	80.80
RAS/0/015	Development of TCDC in Asia and the Pacific	TC IND ROK CPR	94.80 50.00 25.00 50.00
RAS/0/019	Nuclear Information Systems	TC	66.60
RAS/4/008 CRP: E1.10.06 E1.10.07	Nuclear Instrument Maintenance	TC	168.00
RAS/4/011 CRP: F1.20.09	Research Reactor Utilization	TC	80.80
RAS/5/021 (RAS/89/045)	Improvement of Grain-Legume Rhizobium Symbiosis to fix Atmospheric Nitrogen	UNDP	74.50
RAS/6/016	Use of Computers in Technetium - 99m Imaging	TC	132.00
RAS/6/018	Radioimmunoassay for Hepatitis B Diagnosis	TC	204.80
RAS/6/022	Strengthening of Nuclear Medicine in RCA Member States	AUL	110.00
RAS/7/003 CRP: E3.10.04	Radiation Sterilization of Tissue Grafts	TC	153.20
RAS/8/068 RAS/8/069 RAS/8/070 RAS/8/071 (RAS/92/073)	UNDP "Environmentally Sound Technologies"	TC AUL JPN UNDP MAL	150.40 155.00 320.00 797.30 10,00
RAS/9/006 CRP: J3.20.01	Strengthening of Radiation Protection Infrastructure	TC JPN AUL	92.40 200.00 102.50

Project No.	Title	Fund Source	BUDGET US $k 1994
CRP	Evaluation of radioactive iodine therapy for hyperthyroidism	JPN	100.00
Total			3218.10

* Note these figures are estimates only. In particular they do not imply commitment by donor countries.

Tuban, 28 March 1994

Dr David J. Cook
Executive Director
ANSTO
Australia

Fax # : 001 61 2 543 6907

Dear Dr Cook,

It was the unanimous decision of the delegates to the 16th RCA Working Group Meeting in Bali, 22-25 March 1994, that their thanks to you be recorded and sent to you, following the announcement of your resigning in the ANSTO News Release of 22 March 1994. All delegates expressed regret at your leaving and wished you every success in the future.

Your strong and effective input to RCA during your period as National RCA Coordinator was noted, as was your sympathetic understanding of regional matters and needs. Your contribution on many levels has greatly assisted in furthering mutual understanding and collaboration among the Member States as well as giving significant inputs, enabling the overall programme to maintain relevance and to progress.

Yours sincerely,

J. F. Easey
RCA Coordinator

Annex 41

To

Dr. R. Chidambaran
Chairman, Atomic Energy Commission
& Secretary, Department of Atomic Energy
Government of India
Anushakti Bhavan
Bombay

Fax no: 91 22 556 0705

On behalf of the delegates to the 16th RCA Working Group Meeting, I would like to express our sadness at the news that our long time colleague and friend Shri R. G. Deshpande has suddenly passed away.

The Meeting wishes to record its appreciation for all support and assistance he provided to RCA over many years. He made a significant contribution to all aspects of the programme enhancing it at many levels with his broad knowledge, experience and expertise.

He was a modest, caring man well-respected by all of us who had the good fortune to be acquainted with him.

I would like to report that the meeting held a one minute silence during the formal session in honour of his memory.

I would be grateful if our condolences could be passed to his family.

Dr. John F. Easey
RCA Coordinator

Statement by Japanese delegation on Agenda item 35:
Other Business concerning Project Officers
and Long-Term Experts for RCA Programmes.

Japanese delegation wishes to call the attention of the Meeting to the fact that the effective performance of a project depends greatly on the capability and incentives of the Agency's project officers and experts assigned to the project. As we have observed in the past, and are observing at present where we see a successful project, there is always a project officer and expert(s) leading the project who are not only technically and administratively competent but also have eagerness and devotion to the project with a full understanding of the purposes of RCA. If we are able to have such a project officer and/or an expert when the project starts, success of the project is almost guaranteed. When we say RCA is successful, we should remind ourselves that the greatest honor should go to them.

If we may cite some of such outstanding names for example, Dr. P. Strohal as the project officer for the radiation project, Dr. R. Mukherjee for radiation sterilization and tissue bank programmes, Dr. Nair for the nuclear medicine programme, all of whom have now retired or going to retire very soon, and Dr. Gilmour as the long-term expert for the NDT programme. We do not need to mention such names who are active presently and will be active for years to come. On this occasion, we would like to express our heartfelt gratitude to these officers and experts for their outstanding work.

In this regard, we wish to ask the Agency to be extremely cautious and prudent in recruiting and assigning the officers and experts for the RCA programme in order to assure that the effective operation of all the RCA Programmes continues in future. We would like to suggest that the Agency might institute a process of open management including discussions with in-house and outside experts, when evaluating officers and experts to be assigned to RCA. This is specially important when the technical backstopping capability within the IAEA technical department is not strong in a particular area.

It may also be considered worthwhile adopting a procedure whereby offices within IAEA responsible for technical and scientific matters such as Department of Research and Isotopes be consulted for approval or referral. The role of the RCA Co-ordinator is vital in all these procedures, and the delegates of Japan would like to express its wishes that the position of the RCA Co-ordinator should further be strengthened when functioning its mandate.