REPORT

Twelfth Working Group Meeting
of
Representatives of RCA Member States

Chiang Mai, Thailand, 19-22 March 1990

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The Twelfth RCA Working Group Meeting, 12th RCA/WG was hosted by the Government of Thailand, and held at Chiang Mai, 19-22 March 1990. It was attended by 41 delegates from 11 RCA Member States. Bangladesh, Singapore and Sri Lanka were not represented. The IAEA delegation was led by Professor Noramly bin Muslim, Deputy Director General, Department of Technical Co-operation. the list of delegates is presented as Annex 1 and the Agenda as Annex 2. The paragraph numbering in this report follows that of the Agenda.

INAUGURAL SESSION

The IAEA was honoured that H.E. Mr. Prachuab Chaiyasan, Minister of Science, Technology and Energy and Mr. Sanga Sabhasri, Permanent Secretary of the Ministry were present at the Inaugural Session.

1. Address of Welcome.

Delegates were welcomed to Chiang Mai and Thailand by Mr. Suchat Mongkolphantha, Secretary General of the Office of Atomic Energy for Peace (OAEP), Ministry of Science, Technology and Energy. He was honoured that the Minister and the Permanent Secretary were able to be present. Mr. Mongkolphantha pointed out that all degates had been carefully selected by their governments. Their efforts were sincerely appreciated. He reminded delegates of the substantial task which lay ahead of them and expressed confidence that they would be inspired in their work by this beautiful part of Thailand. Mr. Mongkolphantha's address is attached as Annex 3.

2. Welcome on behalf of IAEA

In his welcoming remarks, Mr. Noramly presented the compliments of the IAEA to the Government of Thailand through His Excellency. He expressed the Agency's gratitude to the Government for agreeing to host the Meeting and to OAEP for the excellent arrangements. Mr. Noramly pointed out that RCA was entering a sensitive stage of its development. He enumerated a number of factors which could influence the nature of regional co-operation in future years: (a) A polarization of needs within the region, arising from unequal development in the member states; (b) accelerating moves towards technical co-operation amongst developing RCA countries; (c) a broadening intellectual and material resources base; and (d) a trend towards a two-way flow of technology in some projects.

Mr. Noramly informed delegates that the African Regional Agreement, or AFRA, which is modelled closely on RCA has recently been approved. He pointed out that Africa was looking to Asia for guidance and encouraged all RCA countries, collectively or individualy to provide whatever assistance possible. Finally he discussed the question of public acceptance which is a major factor inhibiting the spread of nuclear technology. The full text of Mr. Noramly's speech is presented as Annex 4.

3. Official Opening

The 12th RCA Working Group Meeting was officially opened by H.E. Mr. Prachuab Chaiyasan, Minister of Science, Technology and Energy.

The Minister extended to all a warm and sincere welcome to the land of "Smile and Sincerity". He pointed out that Thailand had been developing nuclear science and technology for many years, and as rapidly as economic and social conditions permitted. Much credit is due to the successful development of both regional and international co-operation.

Some activities in the field of nuclear technology are located in a new complex called Technol Polis near Bangkok. It includes the Thai Irradiation Centre and the Rare Earth Elements Research Centre. The Minister cited the applications of Nucleonic Control Systems technology to the Paper Industry at Banpong, Rajburi and to Coal Processing at the Mae Moh Lignite Mine as examples of successful RCA projects. Finally the Minister reminded delegates that the results of their deliberations during the course of the meeting will prove beneficial to RCA Member Countries. The full text of his speech is attached as Annex 5.

4. Keynote Address

The Keynote Address was presented by H.E. Minister of Science, Technology and Energy.

The Minister commenced his address with a short history of OAEP from its inception under a 1961 Act and a summary of its primary responsibilities. The Thai research reactor TRRI went critical 27 October 1962 and has been used extensively by OAEP as well as universities, hospitals and research institutes for isotope production, and neutron beam applications. The reactor was subsequently modified to a 2 MW TRIGA Mark III with pulse capabilities TRR1-M1 and went critical with this configuration on 7 November 1977.

As a result of on going expansion of operations at the near-by Bangkok International airport a Cabinet decision was made to shift the reactor. Due to economic considerations a new reactor will be acquired until which time the TRR1-M1 will be operated.

Thailand has been a Member State of the IAEA and RCA since the earliest days and has many solid achievements to its credit. The question of public acceptance is one of the most significant factors hindering the spread of nuclear technology. The State Committee of Environment and Public Health is leading an active programme of public education.

Thailand is currently experiencing an annual growth rate in energy demand of 17 per cent to support the economic boom (11 per cent growth in 1989) and the government policy of providing electric power cover to all rural areas. The Minister analysed various options for power generation including nuclear. Again he emphasized that a key to the implementation of this option is public acceptance which depended on public education.

FIRST ADMINISTRATIVE SESSION

The interim chairman was Dr. David Cook, Executive Director, Australian Nuclear Science and Technology Organization ANSTO. He briefly outlined some of the highlights of RCA since the Sydney Working Group Meeting including the involvement of Viet Nam in the Industrial Project, the introduction of new projects, the receipt of the Kilmer Memorial Award, the expansion of the budgets and the issuing of a number of significant publications. He thanked delegates for their support during his period of office.

5. Election of Chairman

Mr. Suchat Mongkolphantha, Secretary General OAEP was nominated Chairman by Viet Nam, seconded by Japan and received with acclamation. Mr. Mongkolphantha thanked delegates for their confidence and pointed out that there was a great deal of work to be done if the expectations of the Meeting were to be realized.

6. Adoption of Agenda.

The Agenda (Annex 2) was adopted without amendment.

7. Draft RCA Annual Report 1989

The draft RCA Annual Report 1989 was circulated prior to the Meeting. The final version of the report will be tabled at the 1990 RCA General Conference Meeting.

In speaking on the report, the RCA Co-ordinator made the following points (a) there were 19 RCA projects in 1989, and the number is stabilizing (b) the rate of growth of resources available to RCA will probably diminish due to policies of zero growth within the Agency and within donor countries (c) the average size of RCA projects has been increasing steadily in recents years and compares fovourably with the related UNDP programme and (d) increasing use is being made of the intellectual resources of regional institutions.

The RCA Co-ordinator pointed out that the Agency will be seeking advice on the following:

a) RCA Agreement 1992-1997. Any proposed changes should be transmitted to the Agency for preliminary consideration at the 1990 RCA General Conference Meeting.

b) UNDP Fifth Programming Cycle 1992-1996. The Agency will require advice on priorities for the project submission to UNDP for funding considerations.

c) Regional Asian TC Programme 1991-1992. The Agency is actively planning the 1991-1992 biennial programme. The full text is attached as Annex 6. Comments are invited.

The draft Annual Report was received without comment although some written corrections were received.

8. Election of Project Committee Chairpersons

The results of the elections were as follows:

a) Medical and Biological Applications of Nuclear Techniques

Professor Dr. Romsai SUWANNIK
Commissionner, Thai Atomic Energy Commission
Chairman, Medical Applications Sub-committee, Thai AEC

Nominated: Malaysia
Seconded: Pakistan

b) Food and Agriculture

Dr. Tanongchit WONGSIRI
Director General, Department of Agriculture
Chairman, Agriculture Applications Sub-committee, Thai AEC

Nominated: China
Seconded: Indonesia

c) Nuclear and Energy Based Projects

Dr. Ratana PUMLEK
Deputy Secretary General OAEP

Nominated: India
Seconded: Republic of Korea

FIRST TECHNICAL SESSION

9. Report by UNDP Project Co-ordinator

The full report of the UNDP Project Co-ordinator is attached as Annex 7. In his verbal report, Mr. Manoon listed some minor amendments and updated information which will appear in the final version. He made special mention of the following highlights: (a) the meetings of National Co-ordinators for NDT and Tracer/NCS; (b) the planning Mission in Viet Nam by the RCA Co-ordiantor and the UNDP Project Co-ordinator; and (c) the Kilmer Memorial Award to the IAEA.

A total of 163 participants attended regional training activities and 720 benefitted from national training courses in 1989. The estimated private investment in the technology was $3.8M and some $1.3M foreshadowed.

He highlighted the work plan for 1990, including: (a) The UNDP Mid-term Evaluation Mission; (b) Tripartitie Review (TRR) Meeting and (c) Regional Workshop on Characterization Methods for New Materials.

The DDG-TC informed delegates that the African Regional Agreement AFRA Annex 8 had been approved by the Board and the first Technical Working Group Meeting was scheduled for Cairo. Africa was looking to Asia for assistance in training. In response to a question from the Malaysian delegate it was pointed out that qualified candidates from outside the Region could attend RCA Course provided that the host government agreed, that it was at no cost to RCA and that such participation was not grounds for rejection of qualified RCA candidates(s). To the knowledge of the UNDP Co-ordinator no such request has yet been received.

10. UNDP Mid-term Evaluation Review

Selections from the draft report are attached as Annex 9. The Evaluation Mission comprised Professor Byong Whi Lee, Professor of Nuclear Enginnering, KAIST, Leader, Mr. George Wheeler, Consultant, and Mr. David Kay, Head Evaluation Section IAEA. Mr. Kay in speaking on the report expressed regret that the Mission could not reach all countries through lack of time but thanked those countries viz Republic of Korea, Japan, China, Indonesia, Malaysia and Thailand which were visited. In summary, the Mission found: (a) a need to address the consequences of different levels of development, (b) the evidence that TCDC was a reality within the project, (c) that the project had mobilized considerable extra-budgetary resources but (d) that its primary impact had been in training, information exchange and raising awareness of the technologies. More could be done in co-ordinating activities with other TC, UNDP and bilateral projects. Overall, project management was found to be effective. The work of the sub-project regional technical advisers was commended.

The Mission found that more could be done to improve trainee selection. It noted that in Phase II the National Regional Executive Management Seminar had grown in importance. However the material presented was often found to be too technical. More should be done to demonstrate the role of the technology in increasing the profitability of their enterpises. The importance of understanding the market place was stressed.

Problems of public acceptance were found to be inhibiting the spread of the technology. Issues of radiation protection and safety should be integrated into the trianing programme.

Concerning future activities, the Mission recommended that due emphasis should be paid to:

a) the need for assistance to small and medium-size industries;

b) the need to address environmental problems; and
c) the need to improve transportation infrastructure.

Strong support for the conclusions of the report was expressed by delegates from the Republic of Korea, India, Malaysia, Pakistan, Australia, Japan, China and Thailand. The Republic of Korea expressed the need for economic feasibility studies; Japan expressed willingness to host a meeting to discuss how to accelerate the technology transfer to RCA countries if widespread support for the idea were forthcoming. Questions of public acceptance were emphasized by Republic of Korea and Australia. The latter offered to provide RCA with literature which is being referred to support a 1990 campaign to improve public acceptance of nuclear related technologies. India enquired whether the TCDC concept could be used to catalyse the spread into the region of instrumentation and equipment developed indigenously by non-industrialized countries.

In response, the DDG confirmed the seriousness with which the agency is addressing the public acceptance issue with reference to the Bombay Seminar attended by the DG. Information on public acceptance issues is available through the Secretariat. The DDG also pointed out that a computer list of equipment is being prepared and will be made available to Member States.

11. Extension of the Regional Industrial Project

Since the RCA Office was receiving feed-back from National Co-ordinators through the UNDP Project Co-ordinator, some infornation was distributed on an informal basis to delegates. Mr. Manoon expressed the view that funding by UNDP was contingent on strong support through the local UNDP offices. This will require an early commitment by donor countries and a commitment by receipent countries to develop local infrastructures essential for technology transfer.

A consensus was reached that the Agency should seek an extension of the industrial project to a third phase provided:

i) there was an adherence to the recommendations of the UNDP Mid-Term Evaluation Mission Report;

ii) the recommendations of the National Co-ordinators were properly taken into account; and

iii) there was adequate prior consultation with Member Sates on the Project Document.

Discussion

A. Two new project proposals were introduced. The first, presented by Japan, is designed to address pollution problems such as acid rain, waste water and sewage resulting from rapid industrialization and population growth. Problems such as acid rain are regional in nature. Radiation technologies are being developed to treat flue gases and to render hygienic sewage. The Japanese delegate emphasized that there was, as yet, no budget commitment; such considerations would depend on the response from Member States.

Malaysia supported the project. The delegate stressed that the need to address pollution is the responsibility of all countries. Malaysia was prepared to support the project provided it was understood that the need to address pollution problems was the responsibility of all countries. Support was expressed by India, Pakistan and China where relevant work had already commenced. India offered to share experience on sewage treatment through the project. The proposal was also welcomed by Viet Nam, Republic of Korea, Thailand and Indonesia.

In conclusion the delegate from Japan noted the in principle Working Group support and would consider hosting a project formulation meeting.

The second project was an Australian proposal on termite control and eradication. The project was supported by Pakistan, China and Viet Nam.

B. Amongst other issues raised were the following: (a) Pakistan suggested that a second RCA Seminar should be convened in 1991, and agreed that the question be referred to the 1990 RCA General Conference Meeting, (b) Pakistan further enquired whether RCA support for a National Industrial Forum could be considered. It was pointed out that widespread, technology transfer to productive industry required the co-ordinated efforts of committed people in both the public and private arenas.

The DDG noted the favorable comments on the Evaluation Report. He also noted that the new proposals were consistent with Agency policy and recommended further discussion at the General Conference Meeting.

SECOND TECHNICAL SESSION
Medical and Biological Applications of Nuclear Techniques

12. Constitution of the Project Committee

The project committee was constituted with Professor Dr. Romsai SUWANNIK in the chair.

13. Technical Co-operation projects

13.1 Radioimmunoassay of Thyroid Related Hormones (Annex 10)

13.2 Proposed Phase II RIA for Hepatitis B Diagnosis (Annex 11)

Following the Chairman's introduction, the delegate from Australia praised the technical officer for catalysing technology transfer in this area and providing the basis for continuing growth. The Hepatitis B proposal was a natural successor to the thyroid related hormones project. Different approaches to diagnosis were inevitable. Some laboratories would prefer radioisotope and others enzyme based immunoassay techniques. The hepatitis problem is enormous and a cheap reliable diagnosis is required to underpin the vaccination programmes. The delegate from Japan agreed with this assessment and pointed out that hepatitis was an important problem in developed countries as well. He suggested the programme should include Hepatitis A,B, C and E and enquired whether there was a related CRP.

China strongly supported the programme and announced it would be hosting a Regional Training Course in Shanghai early 1991. Support was also expressed by India, Indonesia, Pakistan, Republic of Korea, Malaysia, Philippines and Viet Nam. The delegate from Pakistan pointed out that the INMOL laboratory, Lahore, had actively supported the thyroid project through (a) contributing to the regional EQAS, (b) contributing to the regional supply of reagents and (c) providing a software package to the region.

The National Co-ordiator for Thailand summarized the achievements of the regional RCA thryroid project as follows:

- reduction in the cost of reagents
- increase awareness of QC
- teaching and training courses developed at the regional and national levels
- reagent production development in Indonesia, Pakistan and Thailand
- EQAS now self contained and self sustained within the region
- clinical trial of thyroid function testing
- creation of research activities
- creation of scientific co-operation within the country and within the Region

It was recommended that some additional support be provided for EQAS, for the clinical testing of thyroid function and for the proposed extension to Hepatitis B diagnosis.

In summary the DDG congratulated those involved on the impact made by the project and undertook to make an appropriate report the TACC and the Board.

13.3 Use of Computers in Technetium 99m Imaging (Annex 12)

Following an introduction by the Chairman, the Australian delegate assessed the long-term achievements of the project in terms of establishing a network between the scientific leaders of the nuclear medical community within the Region. He then proceeded to comment on the state of Nuclear

Medicine in the region in terms of the triangle (Annex 13).

Radiopharmaceuticals
Instrumentation
People.

Provided there was adequate financial support, hospitals had almost immediate access to an enormous range of radiopharmaceuticals and instrument capability. However, damage had been done to nuclear medicine by placing undue emphasis on the structural techniques of X-ray CT, NMR and Ultrasound. These techniques complement rather than replace the chemical diagnoses of the nuclear medicine physician. A change in recruitment policy cannot easily correct the imbalance as it takes 3 years to train a technician, 5 years for a physicist and 10 years for a physician.

Malaysia was also concerned with the qualificaiton and certification of nuclear medicine physicians. India is currently providing a post graduate course in nuclear medicine at BARC and a post graduate degree programme is likely to be introduced in the near future. The spread of nuclear medicine is being limited by the inadequate availability of trained personnel, equipment, funds from the states and central support. Nuclear medicine was not a top priority in the nation's health care requirements. BARC is currently building a prototype gamma camera. The Department of Atomic Energy is undertaking a project to extened nuclear medicine facilities in the country.

The delegate from Pakistan pointed out that there were 9 nuclear medical centres in his country with a cumulative 150 centre years experience. A post graduate course in nuclear medicine has been started.

The Australian delegate noted the lack of well qualified nuclear medicine personnel within the region and pledged that ANSTO would do what it could to help.

Additional support for the project was expressed by the Philippines, China and Viet Nam.

The Head, Evaluation Section, referred to a current evaluation of nuclear medical activities. He found triangle concept useful as it helped to identify limitations to progress. He conceded that the Agency was limited in the influence it could have on manpower dvelopment at the national level, and advocated a fundamental discussion on the question of human resources development policy.

The DDG also referred to the triangle in his summing up, and indicated that the Agency is faced with an enormous challenge of developing training programmes for people of very different backgrounds.

14. Co-ordinated Research Programme

14.1 Imaging procedures for the diagnosis of liver diseases (Phase II) (Annex 14)

Following an introduction by the Chairman, the delegate from Japan reported that considerable progress had already been made. Several hundred US-NM images had been distributed from Japan and analysis and interpretation of the image pairs had been undertaken by many participants. A collection of representative US-NM image pairs from developing countries was under way. A second RCM was scheduled for 1990.

The delegate from Australia considered the project important as the patterns of diseases were different between developing and developed countries. It is hence important to estabish a data set for developing countries. Further advances can be expected with the availability of SPECT.

Thailand, Pakistan, and the Republic of Korea all reprted progress. Korea was pleased to have hosted the preparatory meeting, September 1989.

In conclusion, the DDG thanked Japan for funding the project. The TECDOC which arose from Phase I has been appreciated by developing countries all over the world.

14.2 Improvement of Cancer Therapy (phase II) (Annex 15)

The Chairman commented that this Japanese funded project is very significant as dose control is extremely important for the management of cancer disease.

The delegate from Japan noted that since commencement of the programme in 1989, four or five versions of software have been collected. The Japanese programme has been rewritten for an IBM-PC compatible computer. The software packages are to be compared at the project meeting in June. Pakistan and the Republic of Korea both endorsed the project.

For the information of delegates, the Head, Evaluation Section outlined the results of the review of an Italian funded brachytherapy project in Egypt. The aim of the project was to introduce after-loading techniques to regional hospitals to be used by physicians and nurses after limited (say 1 week) training. The success of the project relied on establishing a viable screening system as it was important to identify cases at an early stage. An extension to the rest of Africa is being discussed. The delegate from Japan felt that collaboration between RCA and the African region might be useful.

The delegate from Malaysia noted that the Ralstron 2B after loading system which was installed under phase I of the RCA project had treated about 2000 cases despite some patient resistance. India has developed a simple after-loading device and installed about 50 units in regional hospitals.

14.3 Inhalation Imaging for the Diagnosis of Respiratory Diseases (Annex 16)

The Chairman pointed out that respiratory diseases are a global problem which cause an enormous amount of human suffering. He commended the collaboration between IAEA and BARC in producing and distributing the nebulizer.

The delegate from India pointed out that the utility of the nebulizer had been demonstrated and that some non-RCA countries had requested units. The delegate from Australia commented that the nebulizer technique could also be used to provide good physiological data. Japan has developed a nebulizer to study plutonium inhalation. Japanese experts initially had some doubts but are now convinced of the utility of the technique and suggest it could be used to study the effects of dust inhalation by workers such as those in sugar plantations and coal mines.

The project is strongly supported by China.

The Meeting recommended the extension of the project.

14.4 Nuclear Techniques for Toxic Elements in Foodstuffs (Annex 17)

The project was introduced by the Chairman. Malaysia, India, Pakistan and Thailand all expressed satisfaction with the project. Japan believes that the outcome of the project might be useful to the CRP on Reference Asian Man. The Chairman requested that reference data be included in the report.

The Meeting was of the view that the Agency should consider continuation of the project.

14.5 The Development of Technetium-99m Generator to Low Power Research Reactors (Annex 18)

The RCA Co-ordinator reviewed the achievements of the project which was coming to an end.

15. Projects with TC and CRP Components

15.1 Development of Radiation Protection Infrastructures (Annex 19)

The delegate from Japan commented that all RCA countries are involved in the Project and that his government is pleased with the current progress. He briefly outlined the schedule of activities. The delegate from India announced that his country would be hosting the Japanese funded Co-ordinated Research Meeting on Reference Asian Man, BARC, December 1990 and an Indian funded Regional Training Course on Safety Aspects in Industrial Applications of Radiation Sources in 1991.

The delegate from Australia foreshadowed an Australian funded Regional Training Course on Developing Infrastructures for Ensuring Radiation Protection, September 1990. Support for the project was reiterated by the Philippines, China, Pakistan and Viet Nam.

15.2 Radiation Sterilization for Tissue Grafts (Annex 20)

The delegate from India noted that a tissue bank had been established at the Tata Memorial Hospital, Bombay and noted that an irradiator was installed at the hospital site for the irradiation of tissue grafts needed. A similar need was expressed by the National Co-ordinator from Thailand. China pointed out that, in addition to Taiyuan, some radiation sterilized tissue grafts have been produced at the Shanghai Radiation Centre. The Philippines has established a tissue bank at the Philippine General Hospital and the Republic of Korea has included plans for a facility within the current 5 year plan at the Korea Biomaterial Research Institute of Wonkwang University with IAEA assistance. Korea is considering hosting a Regional Workshop on Radiation Sterilization of Tissue Grafts, 1990.

The delegate from Pakistan reported that the results on the clinical use of freeze dried radiation sterilized amnion for the treatment of extensive burns was encouraging. Viet Nam is undertaking work at the laboratory scale. Indonesia and Thailand are actively participating in the project. A tissue bank was established at the Siriraj hospital 1984. A regional Workshop was hosted in Bangkok, 1989. Progress in Malaysia is currently limited by staff shortage.

The RCA Co-ordinator noted that the project had evolved from a CRP through a Regional TC Project to a stage where bilateral assistance was being sought by many countries for the establishment of tissue banks. The meeting noted that this project was clearly successful and should continue.

15.3 Care and Maintenance of Nuclear Medical Instruments (Annex 21)

Japan commented that this was an important project which should continue. The delegate from Viet Nam recommended long-term support in the areas of personnel training, the provision of basic test equipment, expert services and advice in the choice of reliable equipment. Viet Nam had 10 nuclear medical centres, four of which were newly established (two with IAEA support). Dalat was producing low cost equipment. Vinatom is planning a national training course in 1991.

A National training courses was organized in Pakistan in late 1989 and others are being planned in Malaysia, the Philippines and Thailand.

India funded a Regional Workshop on the maintenance of nuclear medical instruments in early 1990, and is undertaking a national survey on nuclear medical instruments. India is also assisting through the development of the "Computer Program for Preventive Maintenance". Both China and Korea commented on the importance of the project.

Thailand has been actively involved since 1988 and called for a continuation of the project. The establishment of a regional centre for servicing and maintenance was suggested.

The summary up, the DDG noted the general appreciation of the medical projects and commented on examples of the two way technoloyg flow. He stressed the importance of radiation protection to the IAEA and referred delegates to the evaluation of the Latin American instrument maintenance programme.

THIRD TECHNICAL SESSION
Agricultural Projects

18. Constitution of the Project Committee

The Project Committee was constituted under the chairmanship of Dr. Tanongchit WONGSIRI.

19. Technical Co-operation Project (UNDP funded)

19.1 Food Irradiation Process Control and Acceptance (Annex 22)

The delegate from China reported on the Chinese funded RCA Workshop on the Commercialization of Food Irradiation, Shanghai, January 1990. Recommendations were made on the promotion of trade in irradiated foods. Currently there are 8 clearances in China and about 20,000 t have been irradiation. A national training course in food irradiation and a sales and marketing test are planned.

Viet Nam has cleared seven food items for irradiation and Pakistan four. In addition the Philippines, Indonesia, India, Thailand, the Republic of Korea and Malaysia indicated active involvement in the project. Because of domestic considerations, the involvement of Japan and Australia will be limited.

The DDG-TC noted an increase in requests from developing countries for assistance in food irradition especially since the plublication of the recommendations of the joint WHO/IAEA/FAO/GATT Meeting, Geneva, December 1988. A long term expert had been recruited to service the programme. Public acceptance was still a major issue.

19.2 Improvement of Grain Legume Rhizobium Symbiosis to Fix Atmospheric Nitrogen (Annex 23)

Interest in this project was expressed by Pakistan which will be hosting the first RCM and Regional Workshop, Faisalabad, 2 to 11 May 1990. The delegate from India warned of the need for field trials. He cited examples of sybiotic effects which were observed under laboratory conditions with sterilized soil which could not be repeated int he field. The project is being supported by Malaysia, the Republic of Korea and China. Indonesia wishes to be included.

20. Co-ordinated Research Projects

20.1 Nuclear technique to Improve Domestic Buffalo Production (Annex 24)

The RCA Co-ordinator reminded delegates that this extremly successful project was scheduled to terminate.

20.2 Integrated Control of Tropical Plants Viruses with Nuclear Techniques (Annex 25)

Interest and support was expressed by Pakistan, Viet Nam, Republic of Korea, Malaysia, Indonesia, China and India. The delegate from Japan commented that his government had studied the report of the Project Formulation Meeting, Tsukuba, August 1989. Japan took note of the interst in this project shown by delegates at this Working Group Meeting. In view of the level of support recorded by delegates, further consideration would be given.

21. New project proposals

The following new project proposals were tabled:

a) Regional Programme to Strengthen Research on Animal Reproduction and Disease Diagnosis in Asia through application of Immunoassay Techniques (Annex 26)

b) Regional Asian Project on Nitrogen Fixing Trees for Increasing Soil Fertility, Crop and Fuel Wood Production (Annex 27)

c) New Project Proposal on the Use of Nuclear Techniques to Improve Forest Tree Species, Kyungpook National University, Republic of Korea (Annex 28)

d) Applications of RFLP Technology in Fundamental Genetics and Breeding Programmes in Crops, Agricultural Sciences Institute, Rural Development Administration, Republic of Korea (Annex 29).

Delegates were urged to refer these proposals to their experts for evaluation and to report their considerations to the RCA General Conference Meeting 1990.

22. The Chairman thanked all delegates for the excellent level of participation.

FOURTH TECHNICAL SESSION
Research Reactor and Energy Based Projects

23. Constitution of the Project Committee

The Project Committee was constituted with Dr. Ratana PUMLEK, Deputy Secretary General, OAEP as Chairman.

24. Research Reactor based Project

24.1 Research Reactor Utilization (Annex 30)

The delegate from Malaysia pointed out that his Government proposed the project and hosted the Project Formulation Meeting, Kuala Lumpur, March 1989.

The delegate from China informed the Meeting that China now possesses six research reators, and has accumulated 100 reactor years of operation experience. He outlined recent Chinese advances in the development of research reactors. In 1989, the National Nuclear Safety Administration of China promulgated safety codes and regulations of research reactors. China will fund a Regional Workshop on Reactor Technology and Utilization of the Miniature Neutron Source Reactor in 1990.

India considers the project to be very important and is funding a Regional Training Course on Research Reactor Safety Principles. Australia wishes to be involved in the Project and has just hosted an Inter-regional Training Course on Reactor Core Conversion which was incorporated as an associated project activity within the Project Document.

Pakistan believes that increased emphasis should be placed on the project. Short term scientific visits funded by the Agency should be arranged to study progress in such fields as neutron diffraction, neutron radiography and neutron structure studies. The Philippines wishes to be involved in the CRP approved within the project framework.

The Republic of Korea regards the project as important as the country possesses two aged TRIGA reactors and one multi-purpose research reactor.

The project was also supported by Viet Nam because of the importance of ractors in implementing the on-going nuclear programme and by Indonesia. Indonesia hosted the Second Asian Symposium on Research Reactors at BATAN and reiterated its offer to host a three week Regional Training Course on Computer Applications to Research Reactor Control and Calculations in 1991.

In summing up, the DDG observed that the project had not taken off well. He supported the observations of the Viet Nam delegate that the safe, reliable operation of research reactors is fundamental to the nuclear applications programme. He urged countries to submit proposals for inclusion in the CRP.

24.2 Basic Science using Research Reactors

The project area has been traditionally funded by India and has clearly been appreciated by Member States judging by the high level of attendance project workshops. The following training courses are planned within the framework of this project:

a) Regional Training Course on Isotope Techniques in Hydrology, BARC, Bombay, 7 September - 5 October 1990.

b) Regional Training Course on Safety Aspects in Industrial Applications of Radiation Sources, 1991.

In addition a Regional Workshop in Image Processing in NDT is proposed in 1991.

25. Energy based projects

25.1 Nuclear Power Project Planning and Implementation (Annex 31)

The delegate from the Republic of Korea announced the third in this successful series of training courses funded from Korea's contribution to RCA. Though not currently planning the introduction of nuclear power, Malaysia wishes to participate in the Course.

The DDG noted that the Korean Training Centre was established with Agency assistance and is now being used to assist other Member States.

25.2 Energy and Nuclear Power Planning (Annex 32)

China strongly supports the project and hosted the third Workshop on Energy and Nuclear Power Planning.

The delegate from Korea announced that his country would host the next workshop in the series. Japan supports the project and offered to make lecturers available to the workshop.

Pakistan is actively preparing to host the second in the series of major traning courses on Electric Systems Expansion Planning to be hosted jointly by PAEC and the Water and Power Development Authority (WAPDA) 1991. A local technical committee has been formed.

26. New project proposals

The offer by the Republic of Korea to fund the third in the series of courses on nuclear power planning and implementation was accepted in principle.

27. Concluding comments

The Chairman congratulated Member States on the considerable progress made in implementing the projects in the Research Reactor and Energy Related fields.

COUNTRY STATEMENTS

28. Receipt of Country Statement

Australia (Annex 33)
China (Annex 34)
India (Annex 35)
Indonesia (Annex 36)
Japan (Annex 37)
Republic of Korea (Annex 38)
Malaysia (Annex 39)
Pakistan (Annex 40)
Philippines (Annex 41)
Thailand (Annex 42)
Viet Nam (Annex 43)

SECOND ADMINISTRATIVE SESSION

29. RCA Action Plan 1989-91

The RCA Action Plan (Annex 44) was accepted without amendment.

30. RCA Cost Projections 1990

The Cost Projections (Annex 45) was accepted without amendment. In response to an enquiry, the RCA Co-ordinator noted that the Research Reactor Utilization Project was being funded through extra-budgetary contributions from India and China, the regular budget (through the CRP "Applications of Personal Computers to Enhance Operations and Management of Research Reactors". On the recommendation of the RCA Steering Committee, the RCA Co-ordinator is to seek some additional funding from the Technical Assistance and Co-operation Fund.

31. UNDP Fifth Programming Cycle 1992-97

The Secretariat will report to the RCA General Conference Meeting.

32. Other Business

a) Thirteenth RCA Working Group Meeting, Ho Chi Minh City.

Delegates from Malaysia, Pakistan and Indonesia recommended that the Meeting be scheduled for the week commencing 4 March 1990. The delegate from Viet Nam noted this request.

b) African Regional Agreement, AFRA

All delegations present agreed that a message of support and good will should be sent by the Chairman, 12th RCA Working Group to the Chairman of the First AFRA Technical Working Group Meeting 3 September, Cairo. The text is attached (Annex 46).

c) Public Acceptance

The delegate from Japan referred the meeting to the report of Professor Gardiner on radiation protection which recommends a lowering of the maximum permissible dose. The Australian delegate pointed out that in the future, diagnostic medicine may be included within the ambit of activities requiring formal consideration of the radiation exposive.

The need for RCA to support efforts of Member States to address public acceptance issues was mentioned by India, China and Pakistan. The RCA Co-ordinator undertook to convene an inter-departmental meeting to focus RCA activities in radiation protection which are at present distributed across a number of projects. A focussed programme would be more effective in dealing with public acceptance questions.

33. Presentation and Acceptance of the Meeting Report

Amendments by delegates were noted. The draft will be circulated for endorsement prior to tabling at the RCA General Conference Meeting, September 1990.

CLOSING SESSION

34. Closing remarks by OAEP

Mr. Suchat Mongkolphantha, Secretary General OAEP and Meeting Chairman thanked the Government of Thailand for its co-operation in organizing a very successful meeting. He expressed gratitude to the IAEA and all delegates. The Meeting had provided an opportunity for reunion amongst friends, a forum for the exchange of creative veiws and a framework within which regional co-operation would be strengthened. He thanked in particular Professor Noramly, Dr. Manoon and Dr. Kay of the IAEA and the Chairman of the Project Committees. Finally he paid a generous tribute to the work of the RCA Co-ordinator who was attending his last Working Group in that capacity and made a presentation which was much appreciated. A full text is attached as Annex 46.

35. Official Closing by IAEA

Professor Noramly congratulated OAEP and the Department of Science, Technology and Energy for the efficiency with which the meeting had been conducted. He expessed the Agency's gratitude to the Government of Thailand for hosting the Meeting, to EGAT for hosting the field visit and other support. He congratulated the Meeting Chairman under whose leadership so much was achieved and thanked the three Project Committee chairmen for their invaluable support. He added that the standard of the debate was very high and this was a tribute to all delegates.

The DDG noted that RCA was a government agreement which was being studied by other regions. He added that the regional programmes were an integral part of TC and will be given due consideration in the preparation of the Agency's Medium-Term

Plan. This Plan which is being prepared at the request of the Board will be presented to the Administrative and Budget Committee in May for eventual reference to the June Board and to the General Conference in September.

Mr. Noramly thanked the RCA Co-ordinator for his efforts over the past four years and wished him well. Finally he expressed gratitude to Viet Nam for agreeing to host the next Working Group and invited all RCA Countries to be represented at the Ho Chi Minh City Meeting.

The Deputy Director General then formally declared the Twelfth RCA Working Group Meeting closed.

Twelfth RCA Working Group Meeting of Representatives of RCA Member States

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Annex 2

AGENDA

12TH RCA WORKING GROUP MEETING

CHIANG MAI, 19-22 MARCH 1990

MONDAY, 19 MARCH 1990

09:00 INAUGURAL SESSION

1. Welcome to Chiang Mai and Thailand: Dr. Suchat Mongkolphantha, Secretary General, OAEP

2. Welcome on behalf of IAEA: Professor Noramly bin Muslim, Deputy Director General, Department of Technical Co-operation

3. Official Opening of the Twelfth RCA Working Group Meeting: H.E. Mr. Prachuab Chaiyasan, Minister of Science, Technology and Energy

4. Keynote Address:
H.E. Minister for Science, Technology and Energy

10:15 Coffee Break

10:30 FIRST ADMINISTRATIVE SESSION

5. Election of Chairman and comments by Chairman elect

6. Adoption of Agenda

7. Draft RCA Annual Report 1989

8. Elections of Chairpersons of Project Committees (Article IV of RCA Agreement refers)

   a) Medical and Biological Applications of Nuclear Techniques
   b) Food and Agriculture
   c) Nuclear Science and Energy Based Projects

12:30 Lunch

14:00 FIRST TECHNICAL SESSION

Regional Industrial Project

9. Report by UNDP Project Co-ordinator

10. Mid-term evaluation review

15:15 FIRST TECHNICAL SESSION (cont.)

11. Proposed Phase III a review of draft document

TUESDAY, 20 MARCH 1990

09:00 SECOND TECHNICAL SESSION

Medical and Biological Applications of Nuclear Techniques

12. Constitution of the Project Committee

13. Technical Co-operation (TC) Projects

    13.1 Radioimmunoassay (RIA) of Thyroid Related Hormones
    13.2 Proposed Phase II RIA for Hepatitis B diagnosis
    13.3 Use of Computers in Technetium-99 Imaging

14. Co-ordinated Research Programme (CRP)

    14.1 Imaging Procedures for Diagnosis of Liver Diseases - Phase II
    14.2 Improvement of Cancer Therapy - Phase II
    14.3 Inhalation Imaging for the Diagnosis of Respiratory Diseases
    14.4 Nuclear Techniques for Toxic Elements in Foodstuffs
    14.5 Development of Tc-99m Generators using Low Power Research Reactors.

15. Projects with TC and CRP Components

    15.1 Development of Radiation Protection Infrastructure
    15.2 Radiation Sterilization for Tissue Grafts
    15.3 Care and Maintenance of Nuclear Medical Instruments.

16. New project proposals (if any)

17. Concluding comments by Chairperson

10:45 Coffee

11:00 THIRD TECHNICAL SESSION

Agricultural Projects

18. Constitution of the Project Committee

19. Technical Co-operation Projects (UNDP funded)

    19.1 Food Irradiation Process Control and Acceptance (RPFI III)
    19.2 Improvement of Grain Legume Rhizobium Symbiosis, to Fix Atmospheric Nitrogen

20. Co-ordinated Research Projects

    20.1 Nuclear Techniques to Improve Domestic Buffalo Production
    20.2 Integrated Control of Tropical Plant Viruses with Nuclear Techniques

21. New Project proposals

    21.1 Regional Programme to Strengthen Research on Animal Production and Disease Diagnosis in Asia through Application of Immunoassay Techniques.
    21.2 Regional Asian Project on Nitrogen Fixing Trees for Increasing Soil Fertility, Crop and Fuel Wood Production.

22. Conclusion comments by Chairperson

12:30 Lunch

13:30 FOURTH TECHNICAL SESSION

Research Reactor and Energy Based Projects

23. Constitution of the Project Committee

24. Research Reactor based Project

    24.1 Research Reactor Utilization
    24.2 Basic Science using Research Reactors

25. Energy based Projects.

    25.1 Nuclear Power Project Planning and Implementation (KAERI Training Courses)
    25.2 Energy and Nuclear Power Planning

26. New Project (if any)

27. Concluding comments by Chairperson

14:45 Coffee break

15:00 COUNTRY STATEMENTS

28. Receipt of country Statements.

WEDNESDAY, 21 MARCH 1990

Field visit, Mae Moh Mine, Lampang for Nucleonic Control, Systems in Coal Processing.

THURSDAY 22 MARCH 1990

09:00 SECOND ADMINISTRATIVE SESSION

29. RCA Action Plan 1989-1991
30. RCA cost projections 1990
31. UNDP Fifth Programming Cycle 1992-97
32. Other business
33. Presentation and acceptance of the meeting report.

10:00 Coffee break

11:00 CLOSING SESSION

34. Closing Remarks by OAEP
35. Official closing by IAEA.

Annex 3

WELCOME ADDRESS BY MR.SUCHAT MONGKOLPHANTHA,
SECRETARY GENERAL, OFFICE OF ATOMIC ENERGY FOR PEACE, THAILAND
AT THE 12th RCA WORKING GROUP MEETING, CHIANGMAI, 19 - 22 MARCH 1990

Your Excellency, IAEA Deputy Director General Dr. Noramly,
Distinguished Delegates, Ladies and Gentlemen,

It is my great pleasure to address the twelfth RCA Working Group Meeting. We have been particularly pleased and honored by having privilege to host this important meeting. On behalf of the Office of Atomic Energy for Peace, Thailand and on my own behalf, I would like to extend my warmest welcome you all honored delegates to Chiangmai, the old city particularly known as "Rose of the North" and the most attractive destination with sights and charms.

You all look very fresh and it is heartening to note that you have had a good rest and recovered from time log and other effects. First of all, we are particularly honored that the Minister of Science, Technology and Energy, Mr.Prachuab Chaiyasan, is able to be with us today.

There is no doubt about how important each one of you has been to the RCA Projects Phase I and Phase II and for the near future in Phase III. These Projects are large and complex in terms of management among projects under RCA implementation plan. Each one of you has been carefully selected by your government, and I believe your contributions have been much appreciated by IAEA and the most important factor to the outcome of the Phase I and Phase II achievements.

Now, you have an important task in front of you to be finallized within four days. Under the leadership of the able Dr. Noramly and Dr. Airey, you will no doubt, be able to achieve all the objectives you have set forth to ensure another successful meeting.

I hope all facilities here are sufficient to facilitate the meeting. Please feel free to contact our secretariat and the OAEP working staff for any assistance you may need. I wish you a very pleasant stay in Chiangmai and I hope this beautiful part of Thailand will inspire you and help you achieve a fruitful and rewarding meeting. Thank you.

TWELFTH RCA WORKING GROUP MEETING

CHIANG MAI, THAILAND

19 - 22 MARCH 1990

ADDRESS OF WELCOME

NORAMLY BIN MUSLIM, DEPUTY DIRECTOR GENERAL,

DEPARTMENT OF TECHNICAL CO-OPERATION

His Excellency Mr. Prachuab Chaiyasan, Minister of Science, Technology and Energy

Mr. Suchat Mongkolphantha, Secretary General, OAEP

Distinguished Delegates,

Ladies and Gentlemen,

To travel to Thailand, and to be amongst friends and colleagues from RCA is like returning home. It is a great pleasure to be in Chiang Mai, this beautiful city of the north and to welcome you all on behalf of the Director General of the IAEA to this Twelfth Working Group Meeting of Representatives of RCA Member States.

The Agency deems it an honour that His Excellency Mr. Prachuab Chaiyasan, Minister of Science, Technology and Industry is able to be here this morning. The IAEA presents its compliments to the Government of Thailand through His Excellency and expresses gratitude to his Government for agreeing to host the Working Group Meeting and for its active support for RCA over many years.

Special thanks are due to Mr. Suchat, Secretary General, OAEP, and his staff for the excellent arrangements which are the culmination of a great deal of effort over many months. Good preparations are the foundation of a productive meeting.

RCA is entering a sensitive stage of its development. Conditions are changing and decisions made here could affect the nature of regional nuclear co-operation for many years. May I take this opportunity to outline some of the factors I see at work influencing change.

Firstly, the basis of regional co-operation in Asia is broadening. This is fundamentally due to the rapid development occurring in our part of the world. Progress has not been uniform, however. Although some of our RCA Member States can now act as a bridge between industrialized and developing countries; others are still in need of quite basic assistance. There is a polarization of needs, and this is increasing rather than diminishing. The widening spectrum of needs is reflected in a widening range of projects. Activities in fields ranging from "advanced materials science" through to "basic instrument maintenance" are currently being supported.

Secondly, as a consequence of this polarization, and consistent with a long tradition of co-operation within Asia, particularly at the sub-regional level, RCA is expanding the level of Technical Co-operation among Developing Countries. Regional training activities funded by developing countries is currently the fastest growing segment of the RCA programme. This year, 7 out of the 38 regional training events will be funded by developing countries.

Thirdly, The above-mentioned widening of the spectrum of RCA projects has led to pressures for the broadening of the resources base, both intellectual and material. On the intellectual plane, I am pleased to confirm that, excluding Safeguards, five out of the seven technical divisions of the Agency, together with the Seibersdorf and Monaco Laboratories and the International Centre for Theoretical Physics Trieste are supporting the Regional Asian programme. Supplementing the Agency's technical resources are special relationships which have evolved between about 60 per cent of the RCA projects and institutions of high standing within the Region. This is quite a formidable committed intellectual backing.

On the material side, I am pleased to reiterate the Agency's gratitude to the donor countries Australia, China, India, Japan and the Republic of Korea, and to the UNDP for on-going support. Last year the Asian Development Bank co-financed a major training course and it is hoped that this might be repeated. 'In kind' support has been received from ESCAP, the World Bank, WHO and FAO through the Joint Division. Finally, essential 'in country' resources are provided by all RCA states without which implementation of the programme would not be possible. This resources base is the foundation of the separate networks supporting each of the 19 RCA projects which are focussed on the national counterparts in the 14 RCA countries. The overall result is an extremely complex interacting structure which has a resilience and flexibility to face problems which may lay ahead.

Fourthly, although the overwhelming flow of technology is from the industrialized to the developing countries, a reverse flow is becoming increasingly apparent. Good teachers are also good students. Examples could be cited from the RIA project, the tissue graft project, the instrument maintenance project and the radiation vulcanization project. In the long-term, RCA may gradually evolve from a medium of technology transfer to one of technology exchange.

His Excellency, Distinguished Delegates, Ladies and Gentlemen.

I have outlined four factors which will affect the future direction of RCA, namely (1) the polarization of needs resulting from unequal development rates, (2) the accelerating moves towards technical co-operation amongst developing RCA countries, (3) the broadening intellectual and material resources base for RCA and (4) a detectable trend towards the two way flow of technology. As you may know, the Agency is actively considering the development of a medium-term plan. Such a plan would assist peak bodies, including the Working Group to assess longer-term factors and to use their conclusions in the framing recommendations to the Agency. To be able to see collectively half a decade ahead, albiet hazily, is surely better than having our perspective restricted to a mere one or two years.

Medium-term plans are useful management tools. They are not, however visions of the future. Such visions are the gifts of extra-ordinary men and women. RCA continues to benefit from the insight of those who first saw the strengths of the co-ordinated approach to the use of nuclear technology in addressing developmental problems. The RCA ideals have spread to Latin America and more recently to Africa. I have just arrived from the Kampala Seminar "Africa's Role in Nuclear Science for Peace and Development" sponsored by the Organization of African Unity. The new regional co-operative agreement for Africa, AFRA, was approved. Already _ countries have declared their intention to join. AFRA is modelled very closely on RCA. Africa is looking to Asia for guidance and I would encourage all RCA countries, collectively or individually to provide whatever assistance possible. Perhaps a message of support from this Meeting to the newly constituted Africa Technical Working Group might be considered.

His Excellency, Secretary General, Distinguished Delegates, Ladies and Gentlemen

In this address, I have purposely not dwelt on individual projects. I am pleased to report however, that most are making good progress. By and large this was confirmed by the recent UNDP Mid-term Evaluation of the Regional Industrial Project. However, the Evaluation did highlight a problem which is still of concern to us all. Despite the fact that radioisotope and radiation technology has been increasingly used for forty years, there is still concern amongst industry employees and the general public over questions of radiation exposure. The issue of Public Acceptance is being actively addressed by the Agency. The recent Regional Seminar on Nuclear Power organized by the Government of India and the Department of Public Information and attended by the Director General examined some of the problems. Still much more needs to be done.

In conclusion I would like to reiterate the gratitude of the IAEA to the Government of Thailand for agreeing to host this meeting and to all involved in the excellent arrangements. Gratitude is due also to all RCA countries for their continuing support. We are all privileged to have the opportunity over the next few days, in this lovely part of Thailand, to discuss issues which will help determine the Course of RCA.

I thank you all!

OPENING ADDRESS BY MR.PRACHUAB CHAIYASAN
MINISTER OF SCIENCE, TECHNOLOGY AND ENERGY
AT THE 12th RCA WORKING GROUP MEETING, CHIANG MAI, 19 MARCH 1990

It is both an honor and a privilege for me to have this opportunity to address this 12th RCA Working Group Meeting. On behalf of the Royal Thai Government, I would like to extend to you all, my warm and sincere welcome to the land of "Smile and Sincerity".

Thailand has been intensively developing for nuclear science and technology (NS&T) for many decades as much as economic and social situations permitted. Consequently, the activities of nuclear science and technology have been improving in many aspects such as nuclear medicine, industrial application, agriculture, environment and education. However, the progress obtainable so far has been due to the successful development of both regional and international cooperation.

The long evolution of nuclear science and technology in Thailand has been relying on appropriate techniques, understanding and availability of technology at various points in time of the development. I am very pleased to learn that some activities of nuclear technology are realized at a new complex called "Techno Polis" at the suburb of Bangkok. It is now composed of the Thai Irradiation Centre (TIC) and the Rare Earth Elements Research Centre. Such progress has been of an important development in Thailand, where the achievement derived from the efforts and progressive attitude of Thai people and the effective collaboration between countries.

The achievement of RCA Projects in Thailand are remarkably shown at the two plants of Nucleonic Control System (NCS) in Paper Industry at Banpong, Rajburi and the NCS in Coal Processing at Mae Moh Lignite Mine, Lampang where you will pay a visit on Wednesday 21.

I wish to express my appreciative thanks to the International Atomic Energy Agency for making this meeting possible by providing the organization and arrangements as well as Dr. Noramly and Dr. Airey for their vigorous efforts and support. I would also like to sincerely thank the distinguished delegates for kindly taking your valuable time and personal attempts to make yourselves available to this meeting. I am sure that your expertise, experiences and willingness will be of great value to the success of the RCA Programmes. Lastly, I would like to thank the Office of Atomic Energy for Peace for jointly organizing this meeting.

I learned that you have quite tight schedule in Chiangmai, but I hope you are able to find to enjoy the good part of Thailand and many products made in Thailand.

Ladies and Gentlemen, during the next three days you will have an important task of drawing up policies and guidelines and making recommendations. The result of your deliberation will have important bearing on the future of technical and industrial development of the RCA and Pacific region. Your task will.not be easy, but I am confident that, with collective wisdom of the distinguished representatives gathered here, the meeting will reach meaningful conclusions which will prove beneficial to the RCA member countries. I now have pleasure to declare open the twelfth RCA Working Group Meeting for the year 1990. Thank you.

Agenda Item 7: Draft Annual Report

Comments by RCA Co-ordinator

The draft annual report which was circulated in advance covers the calendar year 1989. I do not propose to speak extensively to the document, but rather allow time for delegates to express their views. The document comprises six chapters. In Chapter 1, a total of nine highlights have been identified. A brief summary of the 1989 Working Group and General Conference Meetings is presented in Chapter 2. Then follows an extensive listing of those supporting the RCA programme at the administrative and technical level. Delegates are earnestly requested to inform the Agency of any errors or omissions so that the final report can be made as accurate as possible. Chapter 4 deals with the technical programme, and Chapter 5 with RCA Resources. Finally, some comments on the future trends and programme are presented.

In his address of welcome, Mr. Noramly mentioned discussions within the Agency concerning a medium-term plan. If it is decided to develop such a document for RCA within the context of wider plan for TC and indeed for the Agency as a whole, the following trends, which have become apparent in 1990 would need to be assessed:

1) Number of projects. There were 19 RCA projects in 1989, compared with 18 in 1990 and a projected 14 in 1991. The 1991 programme will certainly increase with the acceptance of

some new proposals. In brief, the RCA programme is stabilizing at a little under 20 projects. To these should be added Regional Asian Projects not included within RCA (currently 1 project).

2) Resources. The RCA budgets are steadily increasing, and in 1990 are expected to reach about $3.35M. For reasons which are essentially related to policies of zero growth within the Agency and in donor countries, the rate of growth is expected to flatten out. Some comments can be made on various sectors:

i) Technical Assistance Fund. The $615,000 in 1989 is not expected to increase. To do so would be to put pressure on resources for the national TC programmes.

ii) UNDP. The UNDP has increased with the acceptance of two new projects. What will happen after 1992 will depend, very much, on the extent to which RCA can attract UNDP support for an industrial project in the fifth programming cycle. If this is the wish to Member States, the foundation should be laid at this Working Group.

iii) Regular budget. The contribution from the regular budget to the RCA Research Co-ordination Programme has been reducing since 1986 and is continuing to do so. I have expressed concern at this trend to the RCA Steering Committee Meeting, and these concerns were again expressed at the last CCSS Meeting.

Historically, many innovations and new directions have entered RCA through the Co-ordinated Research Programme. This role is even more important to day as Asia looks to addressing its development problems on the best available scientific and technological bases. Were it not for the generosity of donor countries and UNDP support, the situation would be rather more serious.

iv) Extra-budgetary support. Extra-budgetary support from the five donor countries has continued at a high level. In 1989 it amounted to 54.6% of the total with an additional 20.1% from UNDP. Currently, the fastest growing segment of the RCA human resources development programme is group training component funded by developing donor countries. In 1990, 7 out of the 38 activities will be funded by developing countries.

3. Size of projects. The average annual budgets for projects is continuing to increase. In 1987 it was $133,000, 1989 $165,000 and 1990 is expected to be $189,000. The comparable figure for UNDP Regional Asian Projects averaged over the fourth programming cycle 1987-91 is $116,000. A conscious effort is being made to rationalize CRP's and TC projects.

4. Technical Support

The primary source of technical support for the programme are the Agency's technical officers. However, RCA is unique within the Agency in benefitting extensively from the technical expertise of institutes of high standing within the region. This is one of the primary benefits of the high level extra-budgetary support enjoyed by RCA. About 60 per cent of RCA projects are affected.

Issues for consideration

(1) RCA Agreement 1992

The current RCA Agreement is due to expire 11 June 1992. May I suggest that Member States notify the Agency by the time of the General Conference Meeting 1990 whether they would like to see any amendments to the current agreement. These could be given due consideration by the Legal Division and circulated for detailed discussion at the Thirteenth RCA Working Group Meeting, Ho Chi Minh City, possible endorsement at the 1991 RCA General Conference Meeting and approval by the Board.

2. UNDP Fifth Programming Cycle 1992-97

I understand that UNDP will shortly issue a document discussing the development status and related issues in the Asia and Pacific region. This document will assist Agencies in preparing submission for UNDP funding through the 1992-97 cycle. Clearly the total support which IAEA is likely to receive through UNDP is limited. This is particularly so as UNDP is moving towards government implementation of some of its programme. The IAEA will need guidance concerning which project areas support should be sought.

The attention of RCA Office has been drawn to the following needs:

a) on-going support for the Regional Industrial Project,

b) in the field of agriculture, support for a programme to strengthen research on Animal Production and disease diagnosis and on nitrogen fixing trees for increasing soil fertility crop and fuelwood production

c) in the field of medicine, support for a programme to address the enormous hepatitis problem.

Not all areas can be supported. Priorities will need to be established, and your guidance is sought.

3. 1991-1992 Regional Asian TC Programme

In line with TC policy, the size of Regional Asian projects have been growing. However, there are two other constraints which need to be borne in mind. Firstly,the size of the TC funded component of the programme should not increase; secondly, projects should have a finite life. In my view, even successful projects should be renegotiated al initio after the second cycle i.e. after 4 years.

Good proposals, which cannot be funded can be presented as footnote a/ projects.

Under these circumstances, the possibilities of funding by non-RCA Member States needs to be addressed.

Mr. Chairman,

In this brief resume of the 1989 Annual Report and future issues arising, I have dwelt solely on project and related resources issues. This is because projects are at the very foundation of RCA and the strength of RCA derives from the strength and the level of acceptance of its technical programme.

We are, of course, all aware that the is a wider dimension to co-operation. Were this not so, we would not be here this morning. However, it is not the primary role of the RCA Office to analyse these wider issues. The Office can best serve RCA by seeking to maintain and strengthen its foundations.

PROGRESS REPORT 1990

REGIONAL UNDP/IAEA PROJECT ON INDUSTRIAL APPLICATIONS OF ISOTOPES AND RADIATION TECHNOLOGY FOR ASIA AND THE PACIFIC REGION (RAS/86/073)

EXECUTIVE SUMMARY

There were totally 52 events implemented in 1989, and the total expenditure was about US$ 1.6 millions.

The Fifth Meeting of National Coordinator for NDT recommended a wide range of activities to strengthen the technology transfer of the present phase as well as that for the third phase. The meeting of Consultants of the Tracer Technology recommended that strengthening of National Tracer Group be continued, and identified a group of target industries for future technology transfer. Visit to Vietnam of the RCA Coordinator and the Project Coordinator identified short- and medium-terms involvement of Vietnam in the Project.

A highlight in 1989 was a Kilmer Memorial Award to the IAEA from the International Kilmer Memorial Conference for "The Contributions to the transfer of radiation sterilization technology to developing countries".

The First International Symposium on RVNRL was successfully organized by TRCRE of JAERI in cooperation with IAEA. RVNRL was accepted worldwide as a new material for future hygienic product manufacturings because of its nitrosamine-free and sulphur-free properties.

There were 163 persons trained and exposed through regional activities and 1006 persons through done national activities in 1989. The estimated private investment in the technology was US$ 1.8 million; and some US$ 3.3 million of private investment is foreshadowed in 1990.

PROGRESS REPORT 1990

REGIONAL UNDP/IAEA PROJECT ON INDUSTRIAL APPLICATIONS OF ISOTOPES AND RADIATION TECHNOLOGY FOR ASIA AND THE PACIFIC REGION (RAS/86/073)

The Project was implemented as per the Work Plan for 1989, see details in the RCA Annual Report 1989. Various aspects of the project implementation are the following :

1. BUDGET EXPENDITURE

In 1989, the expenditure of UNDP fund was US$ 569,850; and that of extra-budgetary funds from the Governments of Australia, China, and Japan were US$ 500,360, US$ 25,000, and US$ 496,946; respectively. The total expenditure for 1989 was US$ 1,592,156. The project expenditures in period 1987 to 1989 have been US$ 3,383,021 accounting for about 55 % of the total 5-year budget estimates, and it is summarized in **Table 1**.

2. PROJECT COORDINATION

There were several meetings and a mission resulting useful conclusions and recommendations to the Project.

2.1 Consultants Meeting on Tracer Technology

The meeting was held in Jakarta, Indonesia, on 21 June 1989.

Conclusions : see **Table 2**

Recommendations

1. Table 2 should be used to determine self-sufficiency criteria of each national capability.
2. A National Tracer Group (NTG) should have a minimum of four persons including three persons with qualifications in physics, chemistry, and one in electronics and mechanical engineer.
3. Critical technology transfer pathway should be determined by the NTG with assistance of project experts.
4. Major groups of industries that could benefit from radioactive tracer technology are Petroleum, Power Generation and Minerals industries.

5. National commercial tracer service and NTG must conduct their activities in complementary to each other.
6. Any future industrial demonstrations should be recorded on video tapes for use in future NC meeting, Regional and National training courses and Executive Management Seminars.

2.2 <u>The Eleventh RCA Working Group Meeting</u>

The meeting was held in Sydney , Australia, on 13-16 March 1989. The meeting endorsed the following :

1. A consensus on.

   (i) The terms of reference of the Evaluation Mission should be expanded to include recommended activities for Project beyond 1991.

   (ii) A group of consultants from the Region should be constituted to support the Evaluation Mission.

   (iii) If possible, national consultants should be identified to support the Evaluation Mission.

   (iv) The Project Coordinator should be assisted in identifying information on status and national requirements for industrial development and technology transfer, and themes for the Project beyond 1991.

2. The extension of the Project for the third phase with new elements.

2.3. <u>The Fifth Meeting of National Coordinators for Non-Destrutive Testing</u>

The meeting was held in Bangkok, Thailand, on 31 January - 3 February 1989.

<u>Conclusions</u> :

1. The National Coordinators endorsed the recommendation of the Project Expert (NDT) that the SIRIM organization in Malaysia be encouraged to produce procedures which can be used to fabricate type A test pieces.

2. The formation of an Asia and Pacific NDT Foundation is necessary to maintain the links established by the Project and to enhance regional cooperation in NDT.

3. National Coordinators send as many questions as possible but at least 10 for each method to the Project Expert by September in the agreed format.

4. A course on image enhancement of radiographs using image processing techniques be considered at a later stage of the Project.
5. Teach the Trainer courses are still appropriate at Regional Training Courses but they should only last a maximum of 2½ days.

6. It was desirable to make the following course notes available to participants at the RTC Level 3 Radiography: Indian notes, Australian notes, completed chapters of IAEA notes.

7. National Coordinators should be sent copies of the Radiography draft.

8. IAEA TEC DOC 462 should be re-edited.

Recommendations :

1. The Project Coordinator write to the appropriate body in all countries except, China, India and Japan to explain why P membership of ISO TC 135 is necessary.

2. The NDT National Coordinator in China, India and Japan provide the Project Expert (NDT) with the addresses of equipment manufacturers in their countries and an indication of the equipment they manufacture.

3. The Project Expert (NDT) keeps National Coordinators informed of any newly available training materials.

4. The Project Coordinator explores the possibility of more than the approves number of participants from any country attending a Regional Training Course cost free to the Project, and request that the additional participants be given diplomas on successful completion of the course requirements.

5. The Radiography Manual be completed by the end of 1989.

6. The Surface Methods Manual to be in the approved draft format by the end of 1989.

7. The National Coordinator (JPN) should investigate the possibility of organising a Round Robin testing programme to begin in 1990.

8. The Project provides National Coordinators with copies of any fabrication procedures developed at the Regional Training Course in Bandung on the fabrication of Type A test pieces.

9. The Project provides National Coordinators with copies of any fabrications procedures developed at SIRIM, Malaysia.

10. The possibility of SIRIM acting as a Centre to train welders and welding engineers in the art of producing testplates with a controlled number of defects be investigated.

11. National Coordinators exchange lecture notes used for National Training Courses.

12. The Project Coordinator arrange for the Agency to send a proforma to experts recruited for lecturing assignments to facilitate reporting.

13. The prospectus for the Regional Workshop on the Fabrication of Test Pieces explain the desirability of locating a participant with the specified requirements including knowledge of welding ferrous materials and that if no one met the requirements a country should consider sending a second participant at its own expense so that together they met the prospectus requirements.

14. Recruitment of the experts selected for National Training Courses in 1989 can begin.

2.4 The Second Meeting of the NRG Leaders on RVNRL

The meeting was held in Takasaki, Japan, on 24-25 July 1989.

Conclusions and recommendations :

1. It was recognized that the national level R & D activities of RVNRL has been carried out extensively.

2. There is a high demand for RVNRL to manufacture gloves, condoms and other products in Europe as well as in the region. Commercialization of this technology has been done partly.

3. Therefore, it is recommended that IAEA continue to support this project.

2.5. Participation of Vietnam

Vietnam's participation to the Project was approved by UNDP in March 1989 with additional budget to the Project of US$ 135,000. The RCA Coordinator and Project Coordinator visited Vietnam for discussion of the immediate needs of Vietnam and of current and future activities of the Project. The visit resulted of the following conclusions :

Conclusions :

1. Implement requested activities under the framework of the Project :

   - NTC UT-2, Ho Chi Minh City, 13-29 August 1990
   - NTC RT-2, Hanoi, 15-17 November 1990.
   - NTC on Nuclear Gauge for Coal Industry, Hanoi, October 1990
   - Expert mission on Tracer Application in Industry, Ho Chi Minh City, Dalat and Hanoi, 26-30 March 1990
   - Expert mission on Neutron Radiography, 28 February - 1 March 1990.

2. Follow-up on possible collaboration with UNIDO's activities in Vietnam

3. HIGHLIGHTS OF THE PROJECT ACTIVITIES IN 1989

Highlights of regional and national activities are the following :

Tracer Technology

1) Number of members of National Tracer Group (NTG) were trained at the Regional Training Course held in Malaysia. They were reported to have been placed as a key role in strengthening the National Tracer Group (NTG).

2) The NEMS prompted the NTG at BATAN to apply tracer technology to solving problems on mercury inventory in caustic soda plant, leak detection in urea fertilizer plant, leak detection of underground oil pipelines, and mixing studies.

3) The Expert Mission to Indonesia on Tracer Preparation resulted a self-reliance on radioisotope production and preparation capability for tracer applications in Indonesia.

4) The industrial demonstration on leak detection of buried oil pipelines resulted a decision of management of Ceylon Petroleum Corporation to adopt the technique for future usage, of course, with helps from the NTG.

5) Three fellows from Republic of Korea, Pakistan and Thailand were trained for six months at ANSTO, Australia.

Non-Destructive Testing

1) The Regional Workshop on Neutron Radiography prompted recommendation to initiate a Regional Working Group on the subject. Two expert missions are planned in 1990 to formulate modalities for technology transfer under a Regional Working Group scheme.

2) The Regional Workshop on Fabrication of NDT Test Pieces confirmed the fabrication difficulties and needs for developing of such capability in the Region. Follow-up actions are being planned.

3) Malaysian Society for Non-Destructive Testing was inaugurated at the National Conference on NDT held at Kuala Lumpur last July.

4) Mr. Galal Magdi, the UNDP Resident Representative in Jakarta, attended the project activity for the first time at the National Conference on NDT held in Jakarta last November. The conference was inaugurated by the Minister of Manpower, Dr. Cosmas Batubara.

5) The National Seminar on Application of NDT to managers held in Pakistan last December initiated a development of a standard programme to be introduced for use in the other countries in the Region.

Radiation Technology

1. RVNRL

The first International Symposium on RVNRL has resulted a worldwide awareness of the most attractive properties of RVNRL; nitrosamine-free and sulphur-free. It is likely to be accepted as a new material revolutionising hygienic product manufacturing worldwide. Further development on RVNRL in 1990, agreed by NRG leaders, includes **Improvement of Aging Properties, Effect of Non-Rubber Components on RVNRL, Safety Assessment, RVNRL with Electron Beams, and Sensitizer Systems.**

2. Radiation Curing

Modification of the Electron Beam facility in Jakarta was compeleted. Apart from relocation of sander and conveyor line, a laminator and a reverse-roll coater were installed. A local technical group was established to ensure effective use of the facility for technology transfer to local industries as well as for activities under the framework of the Project.

3) Radiation Cross-Linking Application

The Regional Training Course on the subject held last September has resulted an investment decision of Yeonhab Electric Cable Co., Republic of Korea, whose employee attended the course

4) Radiation Sterilization

A major part of regional and national training courses on the subject has resulted the Kilmer Memorial Award to the IAEA from International Kilmer Memorial Conference on the Sterilization of Medical Products. The award cited:

"The contributions to the transfer of radiation sterilization technology to developing countries"

5) Radiation Engineering

A regional network for the Calibration and Standardization of Industrial Process Control are being established in the Region.

6) Others

The Expert Advisory Group Meeting on New Development and Trends in Radiation Chemistry and Technology resulted useful recommendations for future programme and a new framework of the Project on Radiation Technology sub-project.

Nucleonic Control Systems

1) NCS Paper

The Regional Executive Management Seminar supported development of low-cost (< US$100,000) system(s) for small paper mills. The participants also identified Maintenance of NCS as the major need for assistance from the Project in the future.

The National Executive Management Seminar in China resulted in announcement of a government policy to promote and to utilize NCS in paper mills in China.

2) NCS Coal

The coal-ash and moisture monitoring system was inaugu rated at the Mae Moh Mine, Thailand, last November followed by a series of courses, i.e. REMS, RW and RTC on Coal Processing.

4. ACHIEVEMENTS

Manpower Development

There were totally 163 persons trained and exposed through regional activities of the Project in 1989 of which 78 persons were trained through regional training courses, and the rest were exposed to regional workshops and executive management seminars. See **Table 3**.

The larger output on manpower development has been on naional trainings, seminars and workshops. There were totally about 1006 persons trained and exposed to national events in 1989.

Private Investments

There have been indicative private investments in 1989 amounting approximately US$ 1,800,000, and some investment of about US$ 3,300,000 is foreshadowed in 1990. Indicative private investments since 1987 are summarized in **Table 4**.

5. WORK PLAN FOR 1990

In the course of the project coordination, work plan for 1990 was prepared. The work plan as of May 1990 is shown in **Annex** 1. Highlights of activities in 1990 are:

1. Regional activities on Radiation Curing are resumed after major modification of the Electron Beams facility at CAIR-BATAN, Indonesia.

2. Meetings of National Co-ordinators for all sub-projects will be convened.

3. A Tripartite Review (TPR) meeting will be convened for the second time in Phase II.

4. A Regional Workshop on Characterization Methods for New Materials will be organized to discuss possibility of having a regional programme.

6. ACKNOWLEDGEMENT

The Project is very grateful to all governments for the continuing cooperation, particularly the Governments of China, Indonesia, Japan, Malaysia, the Philippines, and Thailand, for hosting regional activities in 1989; and the Governments of Australia, China, India, Japan, Korea, Malaysia, Sri Lanka and Thailand for providing experts to assist the Project.

The Project is also grateful to the kind extra-budgetary contributions of the Governments of Australia, China and Japan.

Table 1. Expenditure of the Budget, RAS/86/073

TOTAL 5-YEAR BUDGET *(EXPENDITURES)* (1987 - 1989)

As of : 31 December 1989

Unit : US$

RAS/86/073

SOURCE	TOTAL	TRACER	N.D.T.	RAD.TECH.	N.C.S.	COORDINATION
+UNDP (F)	3,270,000 *(1,868,959)*	555,710 *(288,810)*	1,205,623 *(698,423)*	701,589 *(518,248)*	371,893 *(124,793)*	435,185 *(238,685)*
*AUSTRALIA	1,250,000 *(550,000)*	250,000 *(180,000)*	-	140,000 *(0)*	860,000 *(370,000)*	-
*JAPAN	1,570,000 *(914,062)*	-	400,000 *(89,256)*	700,000 *(468,517)*	400,000 *(344,935)*	70,000 *(11,354)*
*CHINA	50,000 *(50,000)*	-	-	50,000 *(50,000)*	-	-
TOTAL BUDGET	6,140,000	805,710	1,605,623	1,591,589	1,631,893	505,185
EXPENDITURES	*3,383,021*	*468,810*	*787,679*	*1,036,765*	*839,728*	*250,039*

NOTE : + Figures from revision "F" of the budget
* Estimate

Table 2. Assessment of Potential Tracer Service in the Region

Country	Industrial Awareness (I)	Tracer Technology (II)	Information Transfer (III)	Potential (National) (IV)	Potential (Regional) (V)	Target Industries (VI)
Bangladesh	low	low	moderate	moderate	low	chemicals, cement, and natural gas
China	moderate	moderate	low	moderate	low	petroleum, metal, chemicals, power generation
India	moderate	good	good	moderate	low	chemicals,steel, cement, pollution control
Indonesia	moderate	moderate	good	high	moderate	chemicals,cement, petroleum, power generation and aircraft
Korea	moderate	moderate	low	high	moderate	cement,chemicals,pollution control,automobile
Malaysia	good	moderate	good	moderate	moderate	petroleum, cement, chemicals, minerals, and pollution control
Pakistan	moderate	good	moderate	high	low	chemicals, metal, petroleum
Philippines	good	moderate	moderate	moderate	moderate	minerals, cement, petroleum
Sri Lanka	moderate	low	moderate	moderate	low	petroleum, cement, pollution control
Thailand	moderate	low	moderate	moderate	high	petroleum, pollution control, chemicals
Vietnam	low	low	low	moderate	low	power generation

I = Level of industrial awareness of process control requirements for higher efficiency, better quality control and environmental protection

II = Level of tracer technology including availability of tracers, equipment and manpower

III = Level of information transfer from tracer group to national industry including on safety aspects

IV = Overall assessment of potential for a national tracer service company

V = Overall assessment of potential for a regional tracer service company

VI = Industries which most likely need tracer service.

Tabel 3. Summary of Number of Persons Trained and Directly exposed to the Project.

SUB-PROJECT	REGIONAL					NATIONAL					TOTAL	
	1987	1988	1989	1990	1991	1987	1988	1989	1990	1991	REG.	NAT.
Tracer Technology	-	16	14			53	119	106			30	278
Non-Destructive Testing	68	64	61			*224	306	386			193	*916
Radiation Technology	39	33	38			246	*284	301			110	*831
Nucleonic Control System	26	-	50			102	-	213			76	315
TOTAL	133	113	163			*625	*709	1006			409	*2340

NOTE : * ESTIMATE

Table 4. Summary of Investments Made by Private Sectors

As of : May 1989 RAS/86/073

COMPANY	LOCATION	INVESTMENT (US$)			
		1987	1988	1989	1990
1. Pakistan Radiation Service	Lahore (PAK)	1,800,000 (PRs 32 M)	-	-	-
2. Lucky GoldStar Co. Ltd. (3 EB units)	Seoul (ROK)	4,100,000 (W 3,000 M)	-	-	-
3. Dae Han Electric Co. (1 EB unit)	Seoul (ROK)	N.A	-	-	-
4. Rubber Perkasa Co. (Co-60 Radiation Sterilization)	Jakarta (INS)	-	-	-	2,000,000
5. Asia Kraft Co.	(THA)	250,000	-	-	-
6. Thai Development Paper Co.Ltd.	(THA)	-	800,000	-	-
7. Beijing Paper Mill No. 1	Beijing (CPR)	-	+100,000	-	-
8. (Various paper mills, 11 systems)	(CPR)	-	-	+1,000,000	-
9. Thai Union Paper Co. Ltd.	Samutprakarn (THA)	250,000	250,000	800,000	-
10. Adamjee Paper and Board Co.	(PAK)	-	-	-	*100,000
11. Pakistan Paper Corporation	(PAK)	-	-	-	*100,000
12. Kajang Paper Mills	Kajang (MAL)	-	-	-	*100,000
13. Yeonhab Electric Cable Co.	Seoul (ROK)	-	-	-	*1,000,000
TOTAL		6,150,000	1,150,000	1,800,000	3,300,000

NOTE : * Estimated commitments to invest
+ The system manufactured in the country

ANNEX 1

WORK PLAN FOR 1990

As of : May 1990 TRACER TECHNOLOGY RAS/86/073 - (WP-90)

REF	CODE	ACTIVITY	VENUE	DATES	EXPERT
2.3	NCM	Third Meeting of NC Tracer/NCS	Baguio (PHI)	19-20 Feb	J. Davis
		REGIONAL			
10.6	RTC	Tracer Application in Industry	Lahore (PAK)	27 Oct - 15 Nov	2 Experts(AUL) 1 Expert ?
		EXPERT MISSION			
3.1	EXP	Tracer Application in Industry	HCM+HAN (VIE)	26-30 Mar	J. Easey
E 7.1	EXP	Tracer Application in Industry	Seoul (ROK)	23-27 Jul	J. Easey A. Davison
E 2.3	EXP	Tracer Application in Industry	Jakarta (INS)	14-16 Feb	W. Wiblin
7.3	EXP	Tracer Application in Industry	Dhaka (BGD)	July/Aug. (5 days)	Expert ?
7.4	EXP	Tracer Application in Industry	Colombo (SRL)	July/Aug. (5 days)	1 Expert ?
E11.8	EXP	Tracer Application in Industry	(CPR)	November (5 days)	
		NATIONAL			
11.6	NEMS	Tracer Application in Industry	Dhaka (BGD)	15-22 Nov.	Expert ?
	DEMO	Gas Flow Meter Calib.	Dhaka (BGD)		
12.2	DEMO	Tracer Application in Industry	Colombo (SRL)	Dec. (9 days)	Expert ?
E 9.6	DEMO	Tracer Application in Industry	(ROK)	Sep/Oct? (12 days)	2 Experts(AUL)
E 5.2	NEMS	Tracer Application in Industry	(THA)	11-12 Jun	W. Wiblin T. Kluss
	DEMO	Tracer Application in Industry	(THA)	13-15 Jun	
E 2.1	DEMO/NEMS	Tracer Application in Industry	Baguio (PHI)	26 Feb - 6 March	W. Wiblin T. Kluss
E11.1	DEMO	Mercury Inventory in Industry	(PAK)	November?	2 Experts (AUL)
E11.7	DEMO	Tracer Application in Industry	(INS)	November (2 wks)	2 Experts (AUL)

NOTE : Ref. E 2.1 denotes the first(1) activity in February(2), from an (E)xtra-budgetary contribution.

WORK PLAN FOR 1990

As of : May 1990 NON-DESTRUCTIVE TESTING RAS/86/073 - (WP-90)

REF	CODE	ACTIVITY	VENUE	DATES	EXPERT
4.1	NCM	Sixth Meeting of NC-NDT	Shanghai (CPR)	9-12 Apr.	R. Gilmour B. Zatolokin
		REGIONAL			
2.1	RBM	Meeting of Ad-hoc Reg.Board of Exam. Review	K.Lumpur (MAL)	5-9 Feb.	R.G. + J.R. R.R.W.+ N.O.
6.1	RTC	RT-3	Manila (PHI)	4-22 June	R.R.Wamorkar K. Nakamura (11-22 June) R. Gilmour
7.1	RTC	UT-3	Bandung (INS)	9-27 July	K. Terada R. Gilmour
9.4	RTC	ET-2	Islamabad (PAK)	16 Sep - 4 Oct	K. Coad Sabado
E 9.1	RW	Fabrication of NDT Test Pieces	Kobe (JPN)	10-22 Sep	R. Gilmour, Mr. Ogata, Mr. Sato, Mr. Ooka
11.1	RTC	SM-2	K.Lumpur (MAL)	5-23 Nov	N. Harding
		EXPERT			
E 2.2	EXP	Expert mission on Neutron Radiography	(BGD,THA, VIE,MAL, INS)	26 Feb. - 16 Mar.	N. Wada H. J. Kim
8.3	EXP	Expert mission on Neutron Radiography	(CPR,PAK)	Aug/Sep.	N. Wada ? G. Farny ?
10.1	EXP	Eddy Current Technique	Dhaka (BGD)	7-18 Oct.	K. Coad
		NATIONAL			
3.1	NTC	SM-2	Islamabad (PAK)	3-22 Mar	R. Everett
4.2	NTC	UT-3	Hyderabad (IND)	18 Apr - 11 May	R. Gilmour (23 Apr-11 May)
8.1	NTC	UT-2	HoChiMinh (VIE)	13-29 Aug	R. Gilmour
9.1	NTC	SM-2	(INS)	5-28 Sept	1 Expert ?
9.3	NTC	UT-2	K.Lumpur (MAL)	17 Sept - 3 Oct	R. Gilmour (24 Sep-3 Oct)

NOTE : Ref. E 2.1 denotes the first(1) activity in February(2), from an (E)xtra-budgetary contribution.

REF	CODE	ACTIVITY	VENUE	DATES	EXPERT
		NATIONAL (cont.)			
10.2	NTC	ET-2	Serpong (INS)	3-26 Oct	Sabri (8-26 Oct)
10.3	NTC	UT-2	Bangkok (THA)	4-19 Oct	R. Gilmour
E10.1	NTC	Sizing of Weld Defects using UT	K. Lumpur (MAL)	4-11 Oct.	Japanese ?
10.5	NTC	SM-2	K.Lumpur (MAL)	22 Oct - 3 Nov.	N. Harding (29 Oct-3 Nov)
10.10	NTC	SM-2	Manila (PHI)	22 Oct - 9 Nov	J. Rodda
10.11	NTC	UT-2	Colombo (SRL)	29 Oct - 14 Nov	R. Gilmour
11.2	NTC	RT-2	Hanoi (VIE)	5-17 Nov	G. Singh
10.4	NSM	NDT for NPP	Shanghai (CPR)	8-12 Oct. (5 days)	S.N. Liu
11.3	NSM	NDT Appreciation for Managers	Islamabad (PAK)	11-22 Nov	J. Zirnhelt (17-22 Nov)
11.4	NSM	NDT Appreciation for Managers	K.Lumpur (MAL)	26-27 Nov	J. Zirnhelt
11.5	NSM	NDT Appreciation for Managers	Bangkok ? (THA)	29-30 Nov	J. Zirnhelt
E 9.5	NSM	NDT for NPP	Daeduk (ROK)	27-28 Sept	Miyoshi

NOTE : Ref. E 2.1 denotes the first(1) activity in February(2), from an (E)xtra-budgetary contribution.

WORK PLAN FOR 1990

As of : May 1990 NUCLEONIC CONTROL SYSTEM RAS/86/073 - (WP-90)

REF	CODE	ACTIVITY	VENUE	DATES	EXPERT
		REGIONAL			
2.4	REMS	NCS Minerals	Baguio (PHI)	21-23 Feb	A. Lynch M. Kurr M.R. Jakhu
E11.2	RTC	NCS in Coal Processing	BKK/LMP (THA)	12 Nov.- 7 Dec.	J. Davis K. Smith A. Lynch C. Clarksen
E11.3	RW	NCS in Coal Processing	Lampang (THA)	19-30 Nov.	J. Davis C. Clarksen K. Smith A. Lynch (blending Exp.)
E11.4	REMS	NCS in Coal Processing	Lampang (THA)	22-23 Nov.	A. Lynch J. Davis C. Clarksen K. Smith (Blending Exp.)
		EXPERT MISSION			
E 4.3	EXP	NCS Manufacturing for Small Paper Mills	Beijing (CPR)	13-14 Apr	C. Honma T. Kita
E11.5	EXP	NCS Steel	(IND, INS)	Nov. ? (1.0 m-m)	H. Amano K. Mazanobu
E 7.2	EXP	NCS Steel	Shanghai (CPR)	26-27 July	H. Amano
		NATIONAL			
2.2	NSM	NCS Application in Industry	Manila (PHI)	15-16 Feb	J. Davis H. Saeki
8.2	NSM	Maintenance of NCS in Paper Industry	Beijing (CPR)	6-10 Aug	Rosli MEASUREX Japanese ?
E11.6	NEMS	NCS Civil Engineering	(MAL) (CPR)	November ?	Japanese ?

NOTE : Ref. E 2.1 denotes the first(1) activity in February(2), from an (E)xtra-budgetary contribution.

WORK PLAN FOR 1990

As of : May 1990 RADIATION TECHNOLOGY RAS/86/073 - (WP-90)

REF	CODE	ACTIVITY	VENUE	DATES	EXPERT
E 4.2	NCM	Forth Meeting of NC - Rad. Tech.	Takasaki (JPN)	5-7 April	V. Markovic
		REGIONAL			
E 3.3	REMS	Radiation Curing	Jakarta (INS)	19-21 Mar	V. Markovic J. Garnett Tabata M. Maruyama D. French T. Sasaki
3.4	EAG	Radiation Curing	Jakarta (INS)	22-23 Mar	V. Markovic J. Garnett Tabata M. Maruyama D. French T. Sasaki
E 4.1	EAG	Reg. Cooperation and UNDP Project in 1992-1996	Takasaki (JPN)	3-5 April	V. Markovic J. Garnett Ma Zue Teh K.Krishnamurthy R.G. Deshpande A. Shamshad
5.1	RTC	Industrial Rad. Sterilization - QC & SA	Bangkok (THA)	14-25 May	V. Markovic A. Tallentire N. Hall G. West
5.2	RW	Regulations in Industrial Sterilization	K.Lumpur (MAL)	28-30 May	V. Markovic M. Takehisa M. Saunders P.T. Doolan C. Herring
E 6.1	RTC	Radiation Curing	Jakarta (INS)	4-22 June	J. Garnett T. Tomosue D. French A.A. Neamat T. Sasaki
E 9.7	RTC	Radiation Cross-linking Technology	ChangChun (CPR)	3-14 Sep	Japanese Hun-Jae Bae Locals
9.2	RTC	Radiation Steril. - Material	Bombay (IND)	17-28 Sept	Indians
		EXPERT MISSION			
E 3.1	EXP	Radiation Curing	Jakarta (INS)	12-23 Mar	T. Sasaki
E 3.4	EXP	RVNRL	(ROK)	26-30 Mar	K. Makuuchi

NOTE : Ref. E 2.1 denotes the first(1) activity in February(2), from an (E)xtra-budgetary contribution.

REF	CODE	ACTIVITY	VENUE	DATES	EXPERT
		EXPERT MISSION (cont.)			
E10.2	EXP	Stack Gas Treatment by EB	Shanghai Beijing (CPR)	15-16 Oct. 18-19 Oct.	O. Tokunaga IAEA Experts
E11.9	EXP	Sludge Treatment	Beijing, Shanghai (CPR) (THA) (INS)	Nov. ?	S. Hashimoto K.Krishnamurthy
11.7	EXP	Radiation Facility Renovation	Jakarta (INS)	Nov. ?	K.Krishnamurthy
12.1	EXP	Industrial Rad. Sterilization (feasibility study)	Colombo (SRL)	Dec ?	V.K. Iya
		NATIONAL			
E 3.2	NEMS	Radiation Curing	Jakarta (INS)	15 March	T. Sasaki
E 9.4	NTC	RVNRL	Bangkok (THA)	10-14 Sep.	K. Makuuchi (2 days) Wan (4 days) Marga (3 days)
E 9.3	NWS	RVNRL	K.Lumpur (MAL)	6-8 Sep.	K. Makuuchi (3 days) Chyagrit (3 days) Marga (2 days)
E 9.2	NEMS	RVNRL	Jakarta (INS)	3-4 Sep.	K. Makuuchi (2 days) Chyagrit (3 days) Wan (2 days)
10.12	NTC	Industrial Rad. Sterilization	Suzhou (CPR)	8-12 Oct	A. Tallentire N. Hall
10.7	NEMS	Radiation X-Linking Applications	(IND) (CPR)	4-5 Oct 8-10 Oct	Lyons Studer Japanese EB Manufactrer (cost free)
10.8	NTC	Radiation X-Linking Applications	Shanghai (CPR)	11-19 Oct	Foreign Experts Ma Zue Teh Feng YongXiang
10.9	NTC	Industrial Rad. Sterilization	Manila (PHI)	8-12 Oct	V. Markovic N.G.S. Gopal G. Jacobs

NOTE : Ref. E 2.1 denotes the first(1) activity in February(2), from an (E)xtra-budgetary contribution.

WORK PLAN FOR 1990

As of : May 1990 PROJECT COORDINATION RAS/86/073 - (WP-90)

REF	CODE	ACTIVITY	VENUE	DATES	REMARKS
1.1	MEM	Evaluation Mission	(ROK, JPN, CPR, INS, MAL, THA)	6-31 Jan.	
---	TFM	Task Force Meeting and Consultation	Vienna (AUT)	13 March	
3.2	WGM	RCA Working Group Meeting	ChiangMai (THA)	19-22 Mar	
6.2	MTG	Meeting of National Counterparts	K. Lumpur (MAL)	25-27 Jun	
6.3	TPR	Tripartite Review Meeting	K. Lumpur (MAL)	28 June	
---	TFM, GCM	Task Force Meeting,	Vienna (AUT)	19 Sep ?	
---	RCAM	General Conference, RCA Rep. Meeting	Vienna (AUT)	20 Sep ?	

As of : May 1990 NEW PROJECT RAS/86/073 - (WP-90)

REF	CODE	ACTIVITY	VENUE	DATES	REMARKS
7.2	RW	Characterization Methods for new Materials	Beijing (CPR)	30 July - 3 Aug.	I. Lewkowicz 12 participants 4 lecturers 2 experts (ICTP) 1 Proj.Coord.

REGIONAL CO-OPERATIVE AGREEMENT FOR RESEARCH, DEVELOPMENT AND TRAINING RELATED TO NUCLEAR SCIENCE AND TECHNOLOGY BETWEEN THE AFRICAN MEMBERS OF THE IAEA AND THE AGENCY

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

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

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

NOW, THEREFORE, they have agreed as follows:

ARTICLE 1

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

ARTICLE II

1. There shall be a meeting of representatives of the Governments Parties (hereinafter referred to as the "Meeting of Representatives") to be convened by the Agency as required and, at least, once every year, at the headquarters of the Agency.

2. The Meeting of Representatives shall have the authority:

(a) to determine a programme of activities and to establish priorities therefor;

(b) to consider and approve the co-operative projects proposed by States parties to this Agreement;

(c) to review the implementation of the co-operative projects established in accordance with paragraph 2 of Article III;

(d) to consider the annual report submitted by the Agency pursuant to paragraph 3(f) of Article VII; and

(e) to determine the conditions upon which a Member State other than a Participating Government (as defined in Article V) or an appropriate international organization may participate in a co-operative project;

(f) to consider any other matters related to or connected with the promotion and co-ordination of co-operative projects for the purposes of this Agreement as set forth in Article I.

ARTICLE III

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

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

(a) the nature and objectives of the co-operative project;

(b) the related programme of research, development and training;

(c) the means of implementing the co-operative project and verifying the achievement of project objectives; and

(d) other relevant details as deemed appropriate.

ARTICLE IV

1. Any Government party may participate in a co-operative project established in accordance with Article III, by means of a notification of participation to the Agency, which shall notify the other Governments Parties of such participation.

2. Subject to paragraph 2 of Article VII, the implementation of each co-operative project established in accordance with Article III may start after receipt by the Agency of the third notification of participation in the co-operative project.

ARTICLE V

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

(i) make available the necessary scientific and technical facilities and personnel for the implementation of the co-operative project; and

(ii) take all reasonable and appropriate steps for the acceptance of scientists, engineers or technical experts designated by the other Participating Governments or by the Agency to work at designated installations, and for the assignment of scientists, engineers or technical experts to work at installations designated by the other Participating Governments for the purpose of implementing the co-operative project.

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

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

ARTICLE VI

1. Each Participating Government shall appoint a high ranking official of appropriate technical competence as a national co-ordinator charged with responsibility for projects within its territory or in which the government is involved.

2. There shall be a Technical Working Group composed of the national co-ordinators referred to in paragraph 1 of this Article.

3. The functions of the Technical Working Group shall be:

(a) to determine details for the implementation of each co-operative project in accordance with its objectives;

(b) to establish and amend, as necessary, the portion of the co-operative project to be assigned to each Participating Government, subject to the consent of that Government;

(c) to supervise the implementation of the co-operative project; and

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

4. The meeting of the Technical Working Group shall be convened by the Agency as required and, at least, once every year.

ARTICLE VII

1. The Agency shall perform Secretariat duties during the meetings of Representatives and the meetings of the Technical Working Group.

2. Subject to available resources, the Agency shall endeavour to support co-operative projects established in accordance with this Agreement by means of technical assistance and its other programmes.

3. On the basis of recommendations made by the Technical Working Group pursuant to paragraph 3(d) of Article VI, the Agency shall:

(a) establish annually a schedule of work and modalities for the implementation of the co-operative project;

(b) allocate among the co-operative projects and the Participating Governments the contributions made in accordance with paragraph 3 of Article V and paragraph 1 of Article VIII;

(c) consider the annual reports submitted by the Participating Governments on the implementation of their portions of the co-operative project pursuant to paragraph 2 of Article V;

(d) assist the Participating Governments in the exchange of information and in compiling, publishing and distributing reports on the co-operative project, as appropriate;

(e) provide scientific and administrative support for the meetings of the Technical Working Group; and

(f) prepare annually an overall report on the activities carried out under this Agreement, with particular reference to the implementation of the co-operative projects established in accordance with Article III, and submit it to the Meeting of Representatives.

ARTICLE VIII

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

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

ARTICLE IX

1. Each Participating Government shall apply to a co-operative project established in accordance with Article III, the provisions of the Revised Supplementary Agreement concerning the Provision of Technical Assistance by the International Atomic Energy Agency (hereinafter referred to as "the Revised Supplementary Agreement") that has been concluded with the Agency. If a Participating Government has not concluded a Revised Supplementary Agreement with the Agency, the provisions of the Revised Supplementary Agreement, a copy of which is set out in Annex A to this Agreement, shall be applied by the Government or Member State concerned to the co-operative project.

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

ARTICLE X

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

ARTICLE XI

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

ARTICLE XII

Any Member State of the Agency in the African region according to the Statute of the Agency may become a Party to this Agreement by notifying its acceptance thereof to the Director General of the Agency, who shall inform each Government Party of the acceptances received by him.

ARTICLE XIII

1. This Agreement shall enter into force upon receipt by the Director General of the Agency of notification of acceptance by five Member States belonging to the African region in accordance with Article XII.

2. This Agreement shall continue in force for a period of five years from the date of its entry into force and may be extended for further periods of five years if the Government Parties so agree.

28 Sep 1989
55391, p.10-17

SELECTIONS FROM THE "DRAFT REPORT ON THE MID-TERM EVALUATION OF RAS/86/073"

SUB-PROJECT 1: TRACER TECHNOLOGY

SUMMARY FINDING: The sub-project has assisted national tracer groups in most of the countries visited in demonstrating the usefulness of the technology to regional industries. In the Republic of Korea and the People's Republic of China the manpower and technical skills already appear adequate to meet the likely demands for this technology, and their major need is for more active outreach programmes to make national industries more familiar with the capabilities of these techniques. In these two countries there is a clear ability to assist other States of the region. From the reports presented at the regional consultant meeting in Jakarta, India appears to be considerably further advanced. The sub-project could benefit from additional demonstrations targeted on industries that are broadly present in the region (e.g. cement, thermal power generation, petrochemicals and fertilizers) or from demonstration designed to show the capabilities of tracers for addressing problems (e.g. measuring flows of materials in a pipe) that are generic to many industrial processes. In this connection, every effort should be made to ensure that such demonstrations are open to participants from similar industries in the country and the region. It is recognized that this will not be always easy, but without such opportunities to widely expose the benefits of the techniques the adoption process will be very slow. Additionally, greater attention should be paid to the apparent rising safety concerns of workers and plant managers acceptance with this technique. These concerns should be addressed and answered frankly at all workshops, demonstrations and seminars, and written materials targeted specifically on these issues should be developed by the Agency and made available to participants.

SUB-PROJECT 2: NON-DESTRUCTIVE TESTING (NDT)

SUMMARY FINDING: NDT in most countries has made considerable progress during this second phase of the project. Training has grown in volume and sophistication, and the NDT culture has taken root over most of the region. The immediate challenge is to meet the widely perceived need for regional harmonization of standards. Certainly a first step would be to begin to introduce standardized test pieces for regional intercomparisons; to assist those States that have not yet developed adequate national standards and to move toward the establishment of a regional board of examination and regional qualifying examinations. TCDC can be a reality with regard to NDT as several States already have quite broad areas of competence and others have specific expertise that can be used in regional activities.

Major NDT-related needs within the region are for:

- Course offerings that respond to the clearly differentiated needs of the States that are more advanced and those that are less advanced in terms of NDT practices. For example, the Republic of Korea does not require help from the project to organize basic course in NDT, but would benefit from project organized training in advanced NDT technologies.

- In NDT, it is important to establish the relative level of competencies within and between countries. This will make it possible to establish the meaning of the various certification levels when one State desires to have its test results accepted by another. In the immediate future, this can most readily be done by having significant numbers of certificated individuals cross-certified under another, better-known and internationally-accepted system, such as DGZfp, CSWIP or the ASNT Level III programme. Eventually, it would be useful to arrange round-robin testing of unknown test samples by a cross-section of certified personnel from each country followed by destructive testing to establish the actual conditions in the samples. This would provide a substantial indication of the comparative NDT standards prevailing in the region.

- The emphasis to date in the NDT sub-project on training of Level I and Level II personnel has meant that a self-sustaining training ability has yet to be established in most States. In the future, more emphasis needs to be placed on training the trainers up to a Level III or equivalent. Such a basis will both support a wider and more rapid growth of NDT services in the region and enhance the credibility of the various national NDT programmes. The goal should be to get the project out of basic training as soon as possible.

SUB-PROJECT 3: RADIATION PROCESSING

SUMMARY FINDINGS: Progress has been made during this phase of the project in increasing awareness of the opportunities for industrial radiation processing. In some countries, e.g. Korea, China, India, Indonesia and Malaysia, this increased awareness is clearly leading to new investment decisions and practical applications. TCDC opportunities are also growing within the region. Greater attention in the remaining period of the project should be paid to two issues. First, the safety concerns of workers and plant managers should be addressed directly in the project's various training activities. The mission was repeatedly told that these concerns were playing a role in retarding the application of the technology and, in fact, seemed to be growing. Proven and dependable safety is the essential foundation of the application of any industrial technology, and a project designed to advance the transfer of a technology must address such concerns directly and not treat them as an afterthought. Equally important, the project should increase the attention it pays in its training activities to presenting the economic considerations that are relevant for each of the applications. This is particularly relevant in the Executive Management Seminars where economic considerations should be given at least as much attention as the technical advantages of the specific applications.

SUB-PROJECT 4: NUCLEONIC CONTROL SYSTEMS (NCS)

SUMMARY FINDINGS: This sub-project has demonstrably raised the awareness of regional industry to the advantages offered by nucleonic control systems for increasing productivity, quality and lowering manufacturing costs. In the paper industry the impact of the introduction of such systems can already be seen. Similar promising developments are underway in the mineral processing area. A number of challenges remain, including:

1. Determining whether appropriate systems providing economically attractive cost-benefit advantages are available for small and medium size industry. In most of Asia much of the industrial capacity is centered on such industries, and these are the ones under the greatest pressure to meet the demands of an increasingly competitive trade environment. There is already awareness of the benefits that NCS is providing larger industries. What is absent is convincing evidence that such systems can be applied economically to the specific situations found in the small to medium size firms.
2. Finding effective means of overcoming the obstacle posed by the proprietary nature of the information for specific systems and applications. NCS are an inherent part of a commercial production process where the detailed information on manufacturing and operation may be legitimately viewed as commercially valuable by the suppliers. The result has been to slow down the pace of the technology transfer process. The project has attempted to counteract this by providing an equality of access of all potential suppliers to regional industry. This is certainly a minimum necessity, and one that the project must be vigilant to ensure is maintained.
3. The early adapters of this technology are facing some problems concerning replacement and maintenance of older NCS. These concerns need to be effectively addressed in order to ensure that the technology does not earn an undeserved reputation for lack of effective support.
4. The evaluation mission found a widespread concern with the potential hazard of the nuclear component of this technology even to the extent that it was frequently described as posing a brake on its more rapid introduction. These concerns of acceptability should be addressed "up front" by the project at the time of EMSs, RTCs and Workshops and not relegated to an afterthought. While those most familiar with the technology tend to dismiss the potential real hazard involved, it

should be recognized that such concerns are a reality on the shop floor and factory board rooms of regional industry and the project must directly meet these concerns if it is to be fully successful.

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

OVER-ALL ASSESSMENT Phase II of the UNDP/IAEA Regional Industrial Project has been generally successful in increasing awareness through in the region of the opportunities presented by these technologies for addressing major regional concerns with increasing productivity, quality and reducing the use of scarce energy and raw material inputs. The momentum begun in the first phase appears to be continuing. The project has coped reasonably effectively with the substantial differences that exist among regional countries as to their needs, level of technological sophistication, scale of commercialization, and adaptability of the specific technologies. At the same time, there is substantial evidence of the regional character of the project, and of the substantial contribution that the TCDC approach is making to increasing the resources available to the project. The project has also mobilized additional extrabudgetary resources first from two regional donors who are not recipient States, Australia and Japan, to support these activities, and secondly, from the project host country, Indonesia, and from China [support of a 1989 workshop].

PROJECT DESIGN The basic approach of this second phase — i.e. a large reliance on regional training and information exchanges while continuing the demonstration activities put in place during phase I — appears to be a generally sound approach for catalyzing technology transfer. There could, however, have been a more effectively coupling of project activities with other technical co-operation activities financed by UNDP, the IAEA and bilateral donors. This is a continuing challenge for most regional projects, and one that can only be met by continuing diligent attention to the need to ensure such collaboration. In this project, where the principal task is to increase awareness of the application advantages of several industrial technologies, this issue is particularly important. The actual introduction of these technologies will generally require additional assistance from either national, bilateral or international programmes. While the project in the first two phases appears to have coped in a generally satisfactory fashion with the considerable diversity found in the region, we did note, however, increasing concern as to whether the project would be able to continue to successfully span these differences. In any future phase, this is an issue that will require greater attention.

PROJECT MANAGEMENT The support provided by the project management structure was observed to be generally effective and appreciated by Member States. The technical support provided by regional sub-project technical advisers in the NDT and tracer areas was observed to have been particularly valuable. In future project activities, the use of such regionally-based project technical support should be increased, even if this requires that the IAEA assume more directly at Headquarters a greater proportion of the administrative co-ordination function. We noted that UNDP experience with similar regional projects generally has followed such a distribution of functions.

PROJECT OPERATIONS ◆**TRAINING:** The project has carried out a substantial amount of training activities across a wide range of audiences. It has developed a number of approaches designed to meet the requirements of both technical audiences and managers. In any such training programme one of the most important tasks is selecting the appropriate group of trainees for the appropriate type of training event. The project must make additional efforts to ensure that such placement is more effectively carried out.

Three general problems were recognized. First, trainees selected for some of the technical courses and workshops did not have the necessary background to effectively participate and utilize the training. To some extent, such problems are inherent in a regional activity where there is a great diversity within the region. The solution appears to be (i) closer attention at the selection stage to ensuring that only participants with the required minimum skills and **coming from appropriate institutions** are selected and (ii) organizing both general and specialized training events so that countries that may only require general knowledge concerning a technology can obtain it without being forced to attend highly specialized courses.

Secondly, the national and regional Executive Management Seminars (EMS), which have grown considerably in importance during this second phase, require additional attention in order to play the very important role for which they were designed. Their content generally has been far too technical and failed to address with sufficient rigor the issues of economic costs and benefits. It is these economic factors which are crucial to any decision by industry to proceed with the introduction of a technology. Changes should be made in their structure and content to reflect the important differences between an EMS and a technical seminar. The goal of an EMS should be to interest high level management in the potential of utilizing a specific technology, and this principally requires convincingly presenting the economic, marketing, productivity, quality and profit impacts that will result from adopting a specific technology and the essential elements that must be considered in reaching such a decision. At this level, executives will have only a very secondary interest in the physics, chemistry and engineering details of the technology. Course curricula, lecture content and the selection of lecturers must be made with these factors in mind.Participant selection for the EMS also has not been as effective as desirable. It is very difficult to attract executives away from industry for two day meetings outside of their own country. The EMS need to be made shorter and should target participants from user industries rather than service organizations. Far more attention needs to be given to arranging tightly focused national EMS.

Thirdly, in several States, it was apparent that the national co-ordinators and principal counterpart institutions have an incomplete understanding of the need for having an industrial market for the technology. As a result, the technology tends to remain in the government research institutions, rather than being transferred to industry. It would be useful to try on a pilot basis during the remainder of this phase of the project to hold two or three workshops for the national co-ordinators on marketing and extension strategies for moving technologies from a research base to industrial applications.

◆**PUBLIC ACCEPTANCE:** There has been a substantial increase in concern throughout the region with protection and safety issues surrounding the technologies covered by this project. We are convinced that unless this concern is effectively addressed these technologies will not make the full contribution of which they are capable to regional industrial development. Certainly as a beginning, all of the project training activities should directly address these concerns in relation to the particular technology that they are covering. This attention should not be as an afterthought to an otherwise technical presentation, but must be given equal attention as an important factor that will, in part, determine whether these technologies will be transferred. Additionally, the Agency should consider providing direct assistance to its major counterpart institutions on how to effectively approach public/worker acceptance issues in the context of introducing nuclear applications. It seems to the Team that this Agency assistance will, in all probability, have to extend to providing materials, developing public information strategies and providing training on effective means of addressing management and worker concerns.

FUTURE ACTIVITIES

The project in its first two phases has addressed a number of promising areas of real importance to industrial development throughout the region. The progress made in applying NCS to paper, in advancing NDT and in radiation sterilization of medical products is in many ways remarkable. While the project is not totally responsible for these developments it has played an essential role in their wider application. A number of needs that seem to us to be appropriate, high priority targets for a regional activity remain. These include:

❑**1.** Assistance to small and medium size industries in improving their productivity and quality. Many of the technologies advanced during the first two phases have found regional applications in larger industries. This is natural as it is these industries that have the needed technical base for such innovations and that are involved in highly competitive export markets. Asian economic development and the opening of internal and external markets, however, has progressed so rapidly that small and medium industries throughout the region are feeling considerable pressure to upgrade the quality of their product line and increase their productivity. Many of the technologies already addressed by this project, e.g. NCS and NDT, have ready applications in such small and medium size industry. A future phase of this project could profitably be targeted on the needs of such industries.

❑**2.** Environmental problems associated with industrial production are becoming more serious in the region. Some of these pollution problems, e.g. flue gas pollutants produced in the burning of coal to produce electric power and sewage, have promising — although not yet fully developed — methods of control through the application of nuclear technology. Consideration should be given as to the contribution that a regional activity such as this could make to speeding the solution of these serious problems.

❑**3.** Much of the transport infrastructure of the region is in need of serious upgrading to meet the rapid economic and trade growth being experienced. By the same token, general building construction activity is rapidly increasing. A number of relatively simple nuclear technologies, moisture and soil compaction instruments and tracer studies of sedimentation, can greatly increase speed and safety in the civil engineering industry.

❑4. The project has made considerable progress in advancing the application of NDT techniques in the region. The base will be well established by the conclusion of this phase of the project. A number of advanced application areas — non-metallic materials, crack sizing and eddy current imaging — are now appropriate concerns of the more industrialized States of the region. The introduction of such applications to the region could effectively be supported through regional co-operation.

Project No: RAS/6/011
Project Title: Radioimmunoassay of Thyroid Related Hormones
Project Officer: R.D. Piyasena

Operational since 1987, the project has participation from 14 countries in the Asia and Pacific Region. Within the framework of the overall objectives of reducing costs and improving analytical reliability in the RIA of thyroid related hormones, the project aimed towards improving sources of reagent supply, the introduction of steps necessary for the assurance of assay quality such as internal quality control (IQC) and external quality assessment (EQA), and stimulation of local reagent production to the point of maximal indigenisation of reagent supplies.

The introduction of bulk reagent based methodology to about 100 participant labopratories in 1987 and 1988 together with insistence upon and monitoring of adherance to good RIA practise, resulted in costs being reduced from a previous figure of $ 2.50 to $0.50 per patient sample and the creation of an expanded RIA service of improved quality. Computer based data processing of RIA and IQC data, as further assurance of assay quality, was promoted and the equipment required - to include a program produced as a project activity - supplied. Necessary instruction was provided by means of a number of regional training courses followed up by national ones in most cases. Progress has been closely monitored by means of regular meetings of national coordinators and surveys of participant laboratories by the IAEA project coordinator to whom results are regularly reported.

Building on the basis of what has been acheived, the project, in 1989 and 1990, will focus on the establishment of an EQA scheme as the final arbitrator of assay quality, and on the intensification and organisation in a more formal way of local reagent production activities that would lead to a regional reagent distribution scheme. A regional EQAS has been fully planned with the assistance of international experts at a meeting held early in 1989 and will come into operation later in the year. Local reagent production has already progressed to a stage at which all reagents for the thyroxine (T4) and triiodothyronine (T3) assays are available in several countries and significant progress is being made towards production of reagents for TSH RIA to include the monoclonal antibodies, at regional centres. These activities will be formalised and structured on a most cost effective basis with due regard to sound manufacturing, quality control, and marketing or distribution techniques, at a training course planeed for the latter half of 1989. This will be followed by the organisation of a regional reagent distribution scheme.

The project aims, during the next two years, not only to complete the transfer of the relevant technology but also to exploit the potential and resources that have been and will be made available, as a result of project activities, towards the creation of national or regional self sufficiency in all aspects of the RIA of thyroid hormones. It may be expected that this would enable the provision of a good quality service commensurate with the large clinical demand in the area in question, and also open up increased opportunities for research. It also remains possible that the human resource base and other infrastructural strengths that will remain when the project is concluded could be used in the future to expand on RIA as a diagnostic and investigative tool applied to other areas of public health concern.

A Consultants' Meeting November 1989 recommended extension of the project to include viral hepatitis. Extracts from the report are attached.

HEPATITIS SCREENING BY RADIOIMMUNOASSAY

Report and Recommendations of a Consultants' Group
to the International Atomic Energy Agency
29 November - 1 December 1989

by

M. Kane, I. Caterson, J. Waters, S. Sufi

INTRODUCTION

The International Atomic Energy Agency (IAEA) convened a meeting of consultants' to consider whether the Agency should initiate a project to improve the availability of hepatitis testing by developing reagents for production and distribution by regional laboratories. This project was recommended as the highest priority by national coordinators responsible for a successful programme of thyroid diagnostic test reagent development and use.

This project could occur in three phases. The first, research and development, would serve to modify existing tests for HBsAg to produce a sensitive, specific, and robust assay using freely available reagents with an isotopic endpoint. Candidate assays would be evaluated by an expert committee and by international reference laboratories. Secondly, they would be tested and distributed by regional laboratories.

The third stage of the project would be to transfer the technology of reagent production to selected regional laboratories which could then continue to supply centres in their own and possibly other countries.

Recommendations

The Consultants' Group has made the following recommendations.

1. There is a worldwide need for reliable, affordable Hepatitis B testing and screening and the IAEA should give priority to developing assays for this purpose.

2. Assays:

   a) Radioimmunoassay is both a valid and sensitive method for measuring Hepatitis B antigens and antibodies. Specific sensitive RIAs/IRMAs should be developed and made available to the region through the network of existing laboratories.

   b) The initial test provided (as bulk reagents) should be for Hepatitis B Surface Antigen (HBsAg)

   c) This assay could be used for:
      i) blood bank screening
      ii) clinical diagnosis
      iii) maternal or preimmunisation screening (in association with an immunisation programme)
      iv) epidemiological studies

   d) The consultant panel suggested that consideration must be given to extension of the project for the development of a full viral hepatitis screening panel including
      i) Anti HAV IgM
      ii) Hepatitis B Antibodies
      iii) Hepatitis C
      iv) Hepatitis E

It should also be noted that the methodology could be adapted for HIV testing. Such extension of scope may be part of the overall project.

3. Implementation of Hepatitis testing should be through the laboratories participating in the IAEA thyroid regional project. These should be made aware that the introduction of such testing has the capacity to substantially increase the laboratory workload and will require appropriate health and safety precautions.

   Planning should include provision for extension of the project from these core laboratories.

4. Phases of Programme

   The Consultants suggest three phases for the programme:

   I. Research and Development - which in turn has two components:
      i) method development - the time during which tests are developed
      ii) evaluation - selected assays are evaluated in multiple centres and the appropriate test and reagents selected.

   II. Training and Implementation

   III. Local Production of Reagents.

5. Time Scale

   a) It is recommended that appropriate assays be made available for initial evaluation of methodologies through some expert laboratories if possible by the end of 1990. The results of such evaluation should be reviewed by a Consultants' Technical Committee which will make the final recommendations of the reagents to be used.
   Local evaluation for robustness and other performance characteristics should then be performed through the CRP mechanism immediately thereafter.

b) To allow rapid implementation of this project, it is recommended that a minimum of two Training Fellowships be made available to assist appropriate selected laboratories develop their existing antibodies, assay systems and production techniques during 1990, so that reagents can be available for evaluation.

c) Implementation and Training Programmes should then begin in 1991 to allow the full programme to commence in early 1992.

d) Local Production of reagents would then begin during 1992.

6. Continuous Evaluation of the Programme must be undertaken to ensure appropriate laboratory technical performance, quality control and to monitor reagent production.

7. Technology Transfer
The reagents, cell lines etc. for the production of all assays must be made available to the IAEA to allow for technology transfer to other regions.

8. Co-operation
In view of WHO's commitments to the control of viral hepatitis, and as screening and immunisation for hepatitis are important preventive medicine procedures, the IAEA should consult and seek to cooperate with the WHO in proposed activities in this area.

Title: "Use of Computers in Technetium-99 Imaging"

Project Officer: Mr. G. Van Herk/Mr. R. Ganatra

Participating Member States:

All 12 RCA developing countries.

Objectives:

The objectives of the Australian funded project are (a) to contribute to the diagnostic skills of physicians of the Region through improved use of existing gamma camera/computer configurations within the region and (b) to provide advanced training in the clinical applications of technetium -99m Imaging, as a diagnostic tool.

Major activities 1989

1. Regional Training Course on the Use of Computers in Technetium - 99m Imaging, Sydney, 10 April - 26 May 1989.

2. Three follow-up expert missions to selected RCA countries.

Major Activities 1990

1. Regional Training Course on the Use of Computers in Technetium - 99m Imaging, Sydney, 26 February - 12 April 1990 (prospectus attached).

2. Follow-up expert Mission.

Prospectus

Title:	REGIONAL (RCA) TRAINING COURSE ON THE USE OF COMPUTERS IN TECHNETIUM - 99M IMAGING
Place:	Department of Nuclear Medicine, Royal Prince Alfred Hospital (RPAH); and Australian Nuclear Science and Technology Organization (ANSTO); Sydney, Australia
Date:	26 February - 12 April 1990 A preliminary week, 19 - 23 February 1990 introducing basic computer concepts will be organized for candidates recommended by the Selection Committee.
Deadline for nominations:	15 December 1989
Organizers:	The Government of Australia, through the Royal Prince Alfred Hospital and the Australian Nuclear Science and Technology Organization, in co-operation with the International Atomic Energy Agency (IAEA), within the framework of the Regional Co-operative Agreement (RCA).
Language:	English
Participation:	The course will be open to 12 participants from RCA Member States in the Asia and Pacific region.
Participants' qualifications:	Candidates should have qualifications in a relevant scientific discipline with previous practical experience in nuclear medicine imaging. Preference will be given to candidates who routinely use computers for image data analysis but who are also in a position to provide training to others (physicians, physicists and technologists) on a national basis. **Proficiency in English at a level sufficient to follow the lectures and to take part in the discussions is essential.**
Purpose of the course:	The purpose of the course is to provide participants with advanced training and practical experience in the application of computer techniques for processing and analysis of gamma camera images. The training will include coverage of basic aspects of computing in nuclear medicine with emphasis on clinical applications, which illustrate the quantitative nature of data analysis. The course will include coverage of system management and quality assurance aspects, such as software validation, as well as use of the computer for instrument quality control (QC) and communications. Coverage on the basic theory, QC and applications of single photon emission computed tomography (SPECT) will also be included.

Efforts will be made to provide system-specific tutorials so that participants receive practical training relevant to the computer in their own institute. The aim of the course is to provide individuals with background knowledge and practical experience which will permit them to use computers more effectively and also to enable them to provide further training to other professionals in nuclear medicine at a local level.

Nature of the course:

The course will consist of didactic lectures combined with practical sessions, where each candidate will be expected to work independently on computer. As some previous experience is anticipated a single optional preliminary week will be offered to familiarize those candidates with limited background knowledge. Candidates who wish to participate in this optional week should clearly stipulate this intention. The remainder of the three weeks formal course will include the following subjects:

a) Overview of computer hardware and software.
b) Introduction to principles of programming, including logic, flow charts, documentation.
c) Overview of common data/image processing tools and utilities for data transfer etc.
d) Detailed coverage of clinical applications including relevant physiology, underlying theory of analysis and specific clinical programs.
e) Development of quality assurance procedures including QC and first line maintenance of the camera/computer system, software validation, and the use of computer for instrument QC.
f) Introduction to SPECT, including theory of reconstruction, attenuation correction etc., practical applications, images interpretation, and QC of SPECT.
g) Introduction to current trends in nuclear medicine computing, such as use of personal computers, use of modems for communications, and networking.

The course will also include system-specific tutorials, on the different computer makes, where candidates can either discuss their own specific problems or gain experience on different systems. A workshop is to be included where candidates can discuss the computer experiences and problems in their home countries.

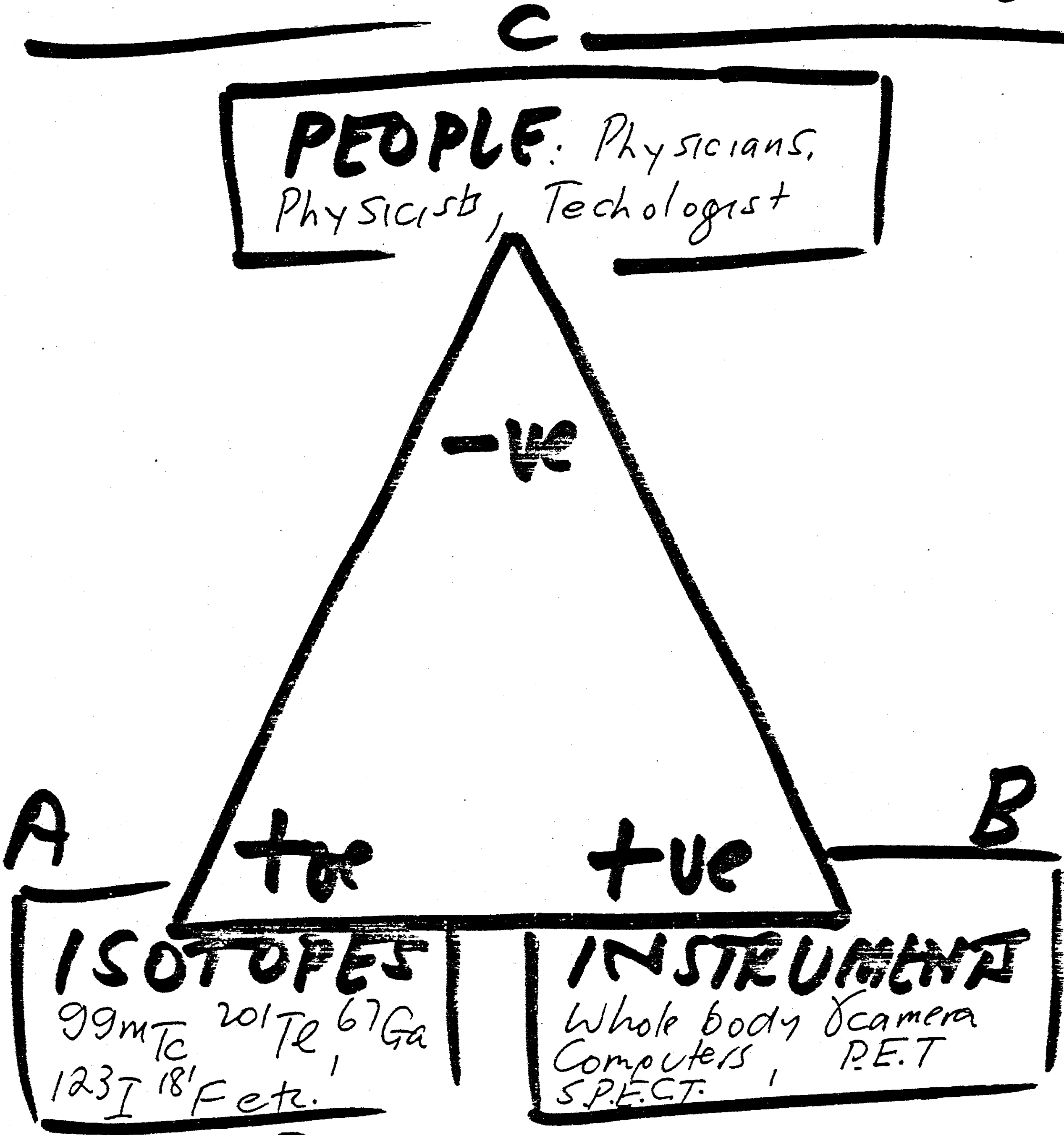
Post-course attachments:

An essential element of the training offered is the provision of a one month period where the participants will be attached to departments of nuclear medicine in the Sydney region. Participants will have the opportunity of working in a busy clinical department where computers play an essential role. Where possible, candidates will be placed in departments which have facilities consistent with the candidate's own equipment and specific areas of interest. Candidates may indicate specific areas of advance study they wish to pursue during this period.

Annex 13

UNDP/ IAEA/ RCA
Industrial Project

NUCLEAR MEDICINE IN THE '90's



A: Buy

B: Buy

C: Identify, Recruit, Train.

Evaluation of Nuclear Medicine procedures for the diagnosis of the liver diseases
Phase II

Project Officer: R. Ganatra

Participating member states:

Austria; Bangladesh; China; India; Indonesia; Japan; Korea, Republic of; Pakistan; Philippines; Singapore; Thailand.

Project Objectives:

1. Objective evaluation of liver scintigraphy and ultrasonography for the diagnosis of focal or diffuse diseases of the liver
2. To determine the extent to which ultrasound imaging can complement nuclear imaging in hospitals in the developing countries with a large referral load of patients with liver diseases
3. To establish the methodology of comparing these two imaging modalities in the context of a developing country
4. To improve the general standard of diagnostic imaging in hospitals of the participating countries by enhancing the quality of images and upgrading their interpretations.

Major activities 1989:

A preparatory meeting of the participants in this CRP was held from September 7 to 9, 1989 at Seoul, South Korea. Each of them described the current status of nuclear and ultrasound imaging in their own countries. The type of the instruments that they can use in this study was determined. QC procedures to be followed for both these imaging methods were prescribed. Computer compatible Proforma to be followed for recording of various data were drawn up. Time schedule of the action plan of this project was decided. A complete report of this meeting is enclosed herewith.

Proposed activities 1990:

I. Survey of the present status of ultrasound imaging in the diagnosis of liver diseases in the participating developing countries.

II. Evaluation of ultrasound and gamma camera phantom images for Quality Assurance about the equipment used in the present study.

III. Interpretation of a set of representative US-NM image pairs collected from Japan.

IV. Analysis of the interpretation data of the Japanese images.

V. Collection of representative US-NM image pairs from the participating developing countries.

Current approval period:

The project will continue for 3 years and conclude in 1992.

Publications:

It is expected that at the conclusion of this CRP, there would be a publication of the "Liver Imaging Atlas II".

1990-01-25
RGanatra/la
5037M

A NEW CRP ON COMPUTER-ASSISTED PLANNING AND DOSIMETRY IN RADIOTHERAPY OF CARCINOMA OF THE CERVIX IN ASIAN COUNTRIES (RCA)

Project Officer: F.A. Durosinmi-Etti

Participating Member States: 10-12 Member States within the region, that satisfy the criteria for inclusion in the project as recommended by the Consultants' Meeting which defined the scope of the project.

Project objectives: To improve the accuracy and standard of treatment planning for radiotherapy of carcinoma of the cervix (brachytherapy and teletherapy) through the introduction of personal-computers-based treatment planning systems. It is expected that improved dosimetry and treatment results will be obtained with consequent improved tumour control and patient survival data.

Major activities in 1989:
(a) Consultations and call for nominations for potential participants.
(b) Identification and selection of suitable treatment planning systems, including software for the project.

Proposed activities 1990:
1. Project formulation meeting between all selected participants during which the protocol would be tested, finalized and adopted (June 1990).
2. Preparation of research contracts and supply of necessary equipment on a needs basis (September 1990).
3. Commencement of the CRP (October 1990).

Current approved period for the project: November 1989 - November 1993.

Publications/major reports: Report from Consultants' Meeting held in December 1988.

FEtti/dw
1990-01-04

Radioaerosol Inhalation imaging for the diagnosis of chronic respiratory diseases in the developing countries

Project Officer. R. Ganatra

Participating member states:

Bangladesh; P.R. China; India; Indonesia; Japan, R. of Korea; Pakistan; Philippines; Singapore; Thailand.

Project Objectives:

Lung imaging is considered as one of the most useful investigation in nuclear medicine, invaluable in life threatening situations like pulmonary embolism. It is also helpful in the evaluation and management of chronic obstructive lung diseases (COPD). Lung imaging is not complete without having images of both the perfusion and the ventilation systems. The latter is difficult to do in many of the developing countries because of the unavailability of labelled gases required for this kind of imaging. The use of radioaerosols now makes it possible to do "complete lung imaging" in these countries and reap its benefit in the diagnosis of many acute and chronic disorders of the lung.

Bhabha Atomic Research Centre of India had designed and fabricated a radioaerosol generator which can be used for inhalation imaging. One of these generators along with the protocols to be followed for clinical imaging was supplied to each of the participants for investigating patients with COPD.

Major activities 1989:

RCM of this programme was held at Seoul, Republic of Korea from 4-6 Sept. 1989.

COPD.

More or less, all the participants had achieved the primary target of doing radioaerosol imaging in 50 patients of COPD as per protocol laid down in the first meeting. The diagnostic sensitivity and specificity of radioaerosol imaging for COPD was close to 100 %, much better than the other lung function indices. BARC nebuliser is working well in the hands of all the participants. Everyone is able to produce acceptable and interpretable images. However, few minor modifications can make this apparatus compact and robust.

Nearly all participants had noticed COPD changes in chronic smokers. This is an early direct visible evidence of damage to the lungs. Are these changes reversible if smoking is stopped? Should such inquiries related to smoking be pursued further by the investigators? Smoking is increasingly becoming a problem of the developing countries also!

MUCOCILIARY FUNCTION

A modified nebuliser assembly developed by the Indian Group for studying the mucociliary function of the lungs, the so called first line of defence in the lungs against the invaders, distributed to all the participants. It was unfortunate that there was a considerable delay in the delivery of the modified assembly to all the participants. This did not leave enough time for the participants to master a complex technique like the study of the mucociliary function. Some could try few cases but, by and large, the participants did not have an adequate experience with this technique. The technique appeared to be difficult and a stringent protocol was devised at the RCM for future trials of this technique.

LUNG MEMBRANE PERMEABILITY.

Several participants had studied the clearance from the lungs of the deposited diffusible aerosols such as Tc99m - DTPA. The technique is easy and not time consuming. The abnormal clearance noticed in chronic smokers was striking. However, it is still not very clear in terms of lung physiology, what exactly is being measured.

Proposed activities:

1. MUCOCILIARY FUNCTION. The protocol for the future studies designed at the last RCM will be tried by all the participants. The albumin required for this study will be ordered by IAEA from Daiichi Co. in Japan, whose preparation had optimal characteristics. Each participant will try to complete 20 cases in the coming year.
2. COPD. Those who had not completed the primary target of investigating 50 patients of COPD could continue till they complete this task.
3. LUNG PERMEABILITY. A protocol for this method was prepared at the last RCM. They can try this method in studying 50 patients of COPD or chronic smokers in 1990.

Current approval period for the project:

Till 1990. However, to give enough time to the participants to complete all the new studies outlined above, the next and the final RCM will be held towards the beginning of 1991. If during that meeting, if the group felt that promising progress was made with the new applications like mucociliary function and lung permeability studies, the Agency may be requested to increase its life span by further one year.

Publications/Major reports:

The attempt on the part of the Group of categorising images, relating the scan appearance with disease and lung function and correlating the lung images with other investigations was highly commendable. It formed a basis for preparing a **lung imaging atlas**. There was no such atlas in the commercial market and the group felt that publication of such an Atlas by the Agency will be of great educational value to the Nuclear Medicine specialists of the developing countries.

An Editorial Committee was set up to select images for inclusion in thelung atlas.

The same Committee would take the responsibility of preparing a **scientific paper** based on the consolidated data from all the participants.

1990-01-25
RGanatra/la
5039M

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

Project Officer:

Eduardo Cortes Toro, Division of Life Sciences.

Participating Member States:

Australia, Bangladesh, China, India, Indonesia, Japan, Malaysia, Pakistan, Thailand.

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

Project Objectives:

The purpose of this CRP is to obtain comparative data on existing elemental concentrations of potentially toxic elements in foodstuffs in various Asian countries. The samples to be collected and analysed are foodstuffs which should be representative of the food most commonly consumed by each of the population groups selected for this study. The elements to be studied include the potentially most toxic trace elements (As, Cd, Hg, Pb, Se). Other elements of local importance or relevant to national monitoring programmes, such as Br, Cr, Cu, Fe, I, Mn, Sb, Tl, and Zn, as well as radionuclides could also be determined. It is expected that participants will use nuclear analytical techniques, such as neutron activation analysis (NAA), for the determination of these elements. These techniques should be supplemented by non-nuclear techniques when necessary. Emphasis is placed on analytical quality assurance.

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

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

Major Activities in 1989:

The third and final Research Co-ordination Meeting (RCM) for the programme took place from 20-24 November 1989 in Jakarta, Indonesia, under the sponsorship of the National Atomic Energy Agency of Indonesia. The meeting was attended by nine of the participants from the region and three others from countries outside the RCA region, as well as by several local observers.

In 1989 the Agency organized a second analytical quality control exercises to check the quality of the analytical chemistry procedures developed and being used at the participants' institutes. The results were discussed extensively at the third RCM. Information exchange was promoted by distribution of relevant progress reports as well as four issues of special bibliographies created from the Agency's INIS database.

Proposed Activities for 1990:

The Programme is due to be phased out in 1990, thus no major activities are foreseen for this year. However, during the third Research Co-ordination Meeting participants asked the Agency to organize another analytical quality control exercise during the first quarter of 1990. The results of this exercise will be reported by the end of April 1990 for evaluation by the Agency. As also discussed at the meeting, final reports from the participants are expected to reach the Agency by the end of July 1990. A final evaluation will then be carried out by the Agency. The exchange of information will continue through the distribution of selected bibliographies from the INIS database. Participants were also encouraged to continue the contacts between them, even after the programme is terminated, to allow exchange of information and discussions in the same enthusiastic way as has been the case so far.

Current approval period for the project:

The project was approved for the period 1985-1990. All of the present research contracts/agreements will be terminated by the end of June 1990.

Publications/Major reports:

A report on the third RCM was prepared and distributed to all participants. This report include the working papers, workshops presentations, a summary of the topics discussed and the conclusions of the meeting. Some participants have published relevant papers in international scientific journals on the research carried out within the framework of this CRP. A list of such publications will be available in the future.

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

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

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

Dr. R. Boyd Australia	CF/3381
Dr. C.N. Desai India	CF/3382
Dr. A. Hanafiah Ws. Indonesia	RC/3412
Dr. H.M. Karim Pakistan	CF/5524
Dr. G. Aungurarat Thailand	RC/3413
Dr. Le Van So Viet Nam	RC/4337

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

- Optimisation of reactor production yields of the ^{98}Mo $(\eta,\gamma)^{99}Mo$ reaction using only inexpensive molybdenum compounds in natural abundance.

- Assessment of the effects of increased neutron irradiation on the Mo targets and on the ^{99m}Tc elution efficiencies, as well as physico-chemical characterisation of the Mo targets.

- Further assessment of the available generator technologies, particularly the solvent extraction and sublimation type.

- Search for alternative and novel approaches and technologies that would produce a generator from $(n,\gamma)^{99}Mo$ with performance characteristics similar to the fission ^{99}Mo-based chromatographic generator.

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

Major Activities (1989):

- The results will be discussed during the last research co-ordination meeting scheduled on 26 to 30 March 1990 in Bombay, India. This meeting will be held jointly with the participants from the European and Middle-East region and a possible continuation of the CRP will be discussed.

Major Activities Proposed for 1990:

- Final Research Co-ordination Meeting

- An IAEA Technical Document will be prepared describing the achievements of the CRP during its entire lifetime.

1150K

Strengthening of Radiation Protection

Project Officer: P. Strohal

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

Project description: The project is a co-operative venture between RCA Member States designed to build up radiation protection infrastructure in a part of the world where rapid expansion in the application of nuclear techniques to both medicine and industry is confidently predicted. The project will comprise training courses, workshops and co-ordinated research programme. A complete description is provided in the 1 December 1987 Project Document which is available on request.

Major activities (1989)

1. Expert Advisory Group, Tokyo, February 1989 to plan the next stage of the programme (Japanese funded).

2. Co-ordinated Research Project: "Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man" (Annex) Japanese funded.

3. Regional Workshops "Personal and Environmental Dosimetry (Annex) Japanese funded.

4. Regional Workshop on Environmental Sampling and Measurements of Radioactivity for Monitory Purposes, Kalpakkam, 9-12 October 1989 (Annex) Indian funded.

5. Regional Training Course: "Radiation Protection" Tokyo and Tokai 16-27 October 1989 Japanese funded.

Proposed Activities 1990

1) Regional Training Course on the Development of Radiation Protection Infrastructure, Sydney September 1990.

2) Co-ordinated Research Meeting, Reference Asian Man India (?) 1990.

3) Regional Workshop: Personal and Environmental Dosimetry, Japan 1990.

COMPILATION OF ANATOMICAL, PHYSIOLOGICAL AND METABOLIC CHARACTERISTICS OF REFERENCE ASIAN MAN

Project Officer: A.A. Moiseev

Participating Member States:

Bangladesh, China, India, Indonesia, Japan, Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, Viet Nam.

Project Objectives:

The purpose of the CRP is to obtain representative physical, physiological and societal data that are anatomical and metabolic, and food intake data in order to set up a Reference Man suitable to the specific conditions and status of each main region of Asia and the Pacific. This information is very important for different aspects of dosimetry (internal and external); it is central to the evaluation of dose factors (dose per unit intake factors, the calculation of different dose limits and reference (invervention, investigation and etc) levels, very useful for adequate dose assessment and planning of radiation treatment in radiation therapy.

Major Activities 1989

As recommended by the Project Formulation Meeting, Mito City, 17-21 October 1988, the major activities were:

a) Collection and compilation of age specific data on weight, height, body-building and other physical parameters of both male and female population of Asia and Pacific.

b) Collection and compilation of data on different food items consumed by the individuals of different specific age and sex group and estimation of daily intake of food and nutrients including data on elemental composition.

Major Activities 1990

Research Co-ordination Meeting.

R.V. Griffith
1990-01-19

Strengthening of Radiation Protection

Major Activity: Dosimetry Intercomparison Programme

Project Officer: R. Griffith

Participating Member States: All

Project Description: This project is a co-operative venture between RCA Member States intended to 1) improve the quality of external dosimetry in those Member States, 2) extend the experiences from the IAEA CRP on Intercomparison of Individual Monitors to RCA Member States that did not have the opportunity to participate in the CRP and 3) assist the RCA in implementing the ICRU operational quantities for individual monitoring.

Project Status: A set of photon irradiations is to be performed in May of this year. A maximum of 24 dosimeters, including controls, will be submitted by each participant. The dosimeters will be returned to the participants for processing and interpretation. The results and future intercomparison plans will be discussed during a workshop to be held in October in Tokyo. A paper describing the Intercomparison Programme is available.

IAEA/RCA WORKSHOP ON ENVIRONMENTAL SAMPLING AND MEASUREMENTS OF RADIOACTIVITY FOR MONITORING PURPOSES

9 - 12 October 1989

Kalpakkam, Tamil Nadu, India

An IAEA/RCA Workshop on Environmental Sampling and Measurements of Radioactivity for Monitoring Purposes was held at Environmental Survey Laboratory, Kalpakkam, 9-12 October 1989. Seven participants from RCA countries - Korea, Singapore, Malaysia, Vietnam, China, Indonesia and Thailand attended the Workshop. Additionally, three guest lectures from Japan, 11 observers and 8 faculty members from India attended the Workshop. A list of participants, observers, guest lecturers and faculty members are given in the Appendix 1.

The Workshop was conducted according to the scheduled programme (Appendix 2). The participants evinced keen interest in both theory and practical sessions. On the concluding day, a feed-back session was arranged in which the views of the participants, experts and observers were elicited. These are summarized below:

1) All participants agreed that while the present Workshop was quite relevant and useful, it was of rather short duration. Some participants expressed a desire to individually carry out the experiments which was not possible due to lack of time. It was suggested that the Workshop could be of 2 weeks duration including morning lectures and practical bench work in the afternoon. More such Workshops covering the area of environmental radioactivity measurements, including sampling and sample preparation were desired.

2) Some participants suggested that in addition to such Workshops long term on the job training, e.g. 3-6 months, in one of the Laboratories in the Region, would be welcome.

3) As regards the future programme of RCA, a number of suggestions were made. These are summarized below:

a) To provide quality assurance, a regional intercomparison programme of environmental radioactivity measurements was desired. Some of the regional food materials, particularly rice may be used as a reference food material besides some fish and vegetation samples. IAEA could give active consideration to the proposal while India and Japan may carry out this programme. In response to Dr. Koyanagi's suggestion on reference standards for trace elements determination, Dr. Schelenz indicated that some reference samples for radioactivity may be used as reference material for trace elements also.

b) It also emerged that two or three Regional Reference Centres for measuring environmental radioactivity and responsible for quality assurance programmes may be established. These Reference Centres could be set up in India and Japan. The Agency may wish to favourably consider this suggestion for future activities in the Region. It was felt that these kind of Centres in close co-operation with IAEA would significantly improve measuring capabilities in the Region.

c) In the light of the participants' request for expert advice on measurements, calibration and analytical needs, it was proposed that experts may be provided originating from countries of the region, who may provide training and assistance when required.

4) **CRP on Asian Reference Man**

This CRP which is presently being carried out has made good progress. This important project should be completed soon and will be quite useful from dosimetry considerations. The first RCM was held in Japan, July 1988. It was proposed that India could be considered for hosting the next meeting in late 1990. It was agreed to consider the proposal when the communication to this effect is received.

5) A general suggestion was made by some participants, particularly from Vietnam and China, that in view of possible delay in processing of applications for visa etc. there is a need to communicate the dates of coming events to them well in advance. Otherwise, they have to encounter difficulties in timely participation. It was agreed that this will be kept in view while organizing such meetings in future.

While concluding the Workshop, the participants expressed appreciation for all the arrangements of the hosting organization made for conducting the Workshop in an efficient manner.

RCA PROJECT SUMMARY (1990)

Project title: CRP on radiation sterilization practices for tissue grafts in clinical use for Asia and the Pacific region (RCA)

Project officer: R.N. Mukherjee, RILS

Participating Member States: A total of eleven RCA Member States (Australia, Bangladesh, China, India, Indonesia, Republic of Korea, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam) have participated since the outset in all the activities of the project concerned, including the research and development (R&D) component, within the framework of the IAEA CRP (1985 to 1990). Some additional RCA Member States have been later attendees and include Malaysia, Singapore and, only recently, Japan (through the close consultative collaboration in tissue graft research of Professor Moritoshi Itoman of the Kitasato University, Sagamihara, Kanagawa 228, Japan). An external non-RCA institute, the Research Tissue Bank in Clwyd, United Kingdom, has provided, through the co-operation of Professor G.O. Phillips, major support and transfer of know-how to the RCA project concerned, including the supply of duly processed samples of tissue allografts for study as well as for clinical trials by the RCA Member States. This status of progressively increasing participation is thus an index of the growing trends and continuing growth of this RCA project which provides assistance to a significant health-care sector of the Asia and Pacific region.

Project objectives:

(a) Background information

With the establishment in some developed countries of techno-economic feasibility for radiation sterilization of several types of non-viable biological tissues (such as bone, nerve, skin, fascia, dura, among others) to help provide a new category of health-care supply, i.e. clinical use of tissue grafts for surgical repair of tissue-damage-associated disabilities of patients, RCA Member States also became interested in this new method. The high priority of this field of application and the justification for developing RCA countries' interest therein, are governed by the following factors:

i. Living standards in a high-density population often render the population more vulnerable to a higher incidence of traumatic accidents (including burns and bone fractures), and to diseases resulting in tissue losses, such as various types of cancer, tuberculosis, leprosy, etc.

ii. Total lack of tissue-banking facilities in the RCA countries and frequent economic inability of patients to afford an import of such tissue-graft implants from possible commercial sources in developed countries, has led to an unfavourable situation where the patients in need cannot at all obtain relevant health-care services.

iii. Already implemented ^{60}Co-gamma radiation processing for (plastic-based) medical disposables in most of the RCA developing countries has provided sufficient technology incentive to further expand the scope(s) of such irradiators through development of radiation processing suitably adapted for biological tissue grafts. These grafts are in standing demand in the national health-care sectors for patients with curable disabilities. The rehabilitation of such disabled persons provides economic returns to both the patient and to the national economy.

(b) <u>RCA action programme thus aimed at</u>

i. Enhancing familiarity of the indigenous teams of surgeons and bio-medical researchers in the RCA countries with the appropriate state-of-art of the clinical usability and radiation-sterilization feasibility, under local conditions, of tissue grafts. The initial phase is to be supported through ready-to-use tissue allografts supplied from tissue banks in advanced donor countries. The CRP on the subject field was initiated to achieve the above goals.

ii. Build-up of trained technical manpower infrastructure to provide support services for self-sufficiency of the RCA countries in terms of local development and production capability for tissue grafts to sustain health care at economical levels. Individual and group training programmes, as well as CRP activities, helped to achieve this goal and production of tissue grafts in the region.

iii. Attainment of RCA regional standardization of tissue processing criteria and guidelines for adaptation, quality control (QC), and optimally meeting the indigenous needs of the specified health-care sector. Dissemination and mutual sharing of experiences in the topical workshop (1989) helped to attain the goals and led to setting up of some national tissue banking.

<u>Major achievements in 1989</u>: Since the RCA project's initiation five years ago when there was no production capability for sterile clinically-usable grafts in the developing RCA member States, the present status of achievement seems commendable and holds still greater promises for the future:

i. China, India and Thailand show capability for successful limited-quantity production of several tissue graft types, sterilized by ^{60}Co-gamma radiation (e.g. bone, chorion-amnion, fascia and dura).

ii. Varying proportions of the sterile grafts so produced are used either in clinical/surgical practices or are involved in R&D studies to develop clinical quality-control guidelines to help upgrade the tissue grafts' intended remedial roles.

iii. The details of the information are presented in Figure I and Table I, respectively.

iv. In contrast to the above multi-tissue approach, several other RCA Member States have had to take recourse to confining their initial attention to only the locally-acceptable tissue types, i.e. chorion-amnion from placental sources, and to prepare sterile burn-wounds dressings. Bangladesh, Indonesia, Malaysia, Pakistan belong to this category of RCA countries.

v. Data from individual countries are presented respectively in Figure II and Table II.

vii. The initial production and clinical applications of radiation-sterilized amnion dressings for burn wounds and bed sores treatment in these countries has, however, helped to mobilize attention and awareness of the medical profession and of the general public regarding the hidden potential of tissue grafts to upgrade health care. This has triggered some work with xenografts (e.g. calf bone, and even pigskin as dressing).

vii. Several remaining RCA Member States, though not at present producing their own grafts, are nevertheless gaining experiences from the grafts acquired as gifts from the fellow RCM Member States.

viii.Almost all these RCA developing Member States have either requested and/or have approval for Agency technical co-operation (TC) on the topic of radiation sterilization of tissue grafts, as a successful impact of the RCA project and relevant follow-ups.

ix. A workshop on the state-of-art of good practices (GMP) for tissue graft procurement, processing and sterilization by radiation, including quality control and health-safety considerations, was successfully held in Bangkok, Thailand, with the participation of twenty members from the RCA countries. Experts from the USA and the United Kingdom helped in the relevant techniques and know-how transfer.

Work programmes planned for 1990: The 1990 programme for the RCA tissue graft project will comprise the following activities:

(a) The approved work programme for the RCA CRP will be carried out and completed, through the co-ordinating efforts of the participating RCA Member State institutes. The final reports of each of the chief scientific investigators (CSI's) will be discussed, and recommendations made for further actions, at the final research co-ordination meeting (RCM), scheduled to be held in December 1990, tentatively in Seoul, Republic of Korea. It is foreseen that the current year's CRP results will include some tissue research data, such as:

i. Impacts of sterilizing radiation dose(s) and/or other tissue-cleaning steps towards the integrity of the biogenic graft factors, such as bone morphogenic protein (BMP), presumed to be of vital significance for bone graft quality and intended clinical and osteoinduction performances.

ii. On the assessment of research results, an improved optimized protocol for tissue processing could be recommended.

iii. Effects of sterilizing radiation dose(s) on collagen macromolecules and/or glycosaminoglycan constituents in tissue grafts, such as fascia, dura, cartilage, etc., to be identified and estimated.

iv. Besides, the types of tissue grafts prepared in different RCA countries and used in clinical practices should be continued for follow-up evaluation in their intended health-care services.

(b) An RCA TC-supported training course on "Radiation sterilization of tissue grafts for safe clinical use" will be held in December 1990, tentatively in Seoul, Republic of Korea. An announcement prospectus and request for nominations from RCA Member States will follow later.

(c) TC projects have been requested by almost each and every one of the developing RCA Member States, on tissue graft sterilization and setting up of criteria and guidelines for quality assurance of grafts to attain the desired clinical/reparative roles for patients. These TC projects will continue to be supervised and acted upon by the Agency's Technical Officer, in due context of the corresponding national data from the RCA CRP and/or other relevant RCA TC activities to enhance integration and avoid wasteful duplication of efforts and resources.

Future outlook and recommendations beyond 1990:

(a) The growing recognition during the course of the current RCA CRP (due to phase out in 1990) has stressed the need and significance for further tissue-processing radiation research in the quality upliftment and control (QC) of finished tissue grafts. This approach is expected to elevate the current tissue protocol above its present many empiricisms and limitations. A further RCA CRP should therefore be initiated to undertake these follow-up tasks, taking advantage of current molecular techniques, including monoclonals for precision identification of BMP's and other biogenic factors.

(b) The RCA programme should continue to sponsor annual workshops and/or group training courses, to foster healthy development in the RCA Member States of ancilliary regional/national integrated guidelines, GMP's and criteria standards, and indigenous capability for radiation-sterilized tissue grafts to serve the health-care demands. The forum as well provides international interactions through invited lecturers from tissue banks in advanced countries.

(c) Relatively more progressive tissue banks in the RCA countries should be encouraged to host the trainees from other RCA countries, where feasible, and thus to enhance the RCA regional co-ordination and operational integration. The experts serving a TC project on tissue grafts in an RCA country should as well promote regional integration of tissue banking.

RMukherjee/dw
1990-02-06

FIGURE I

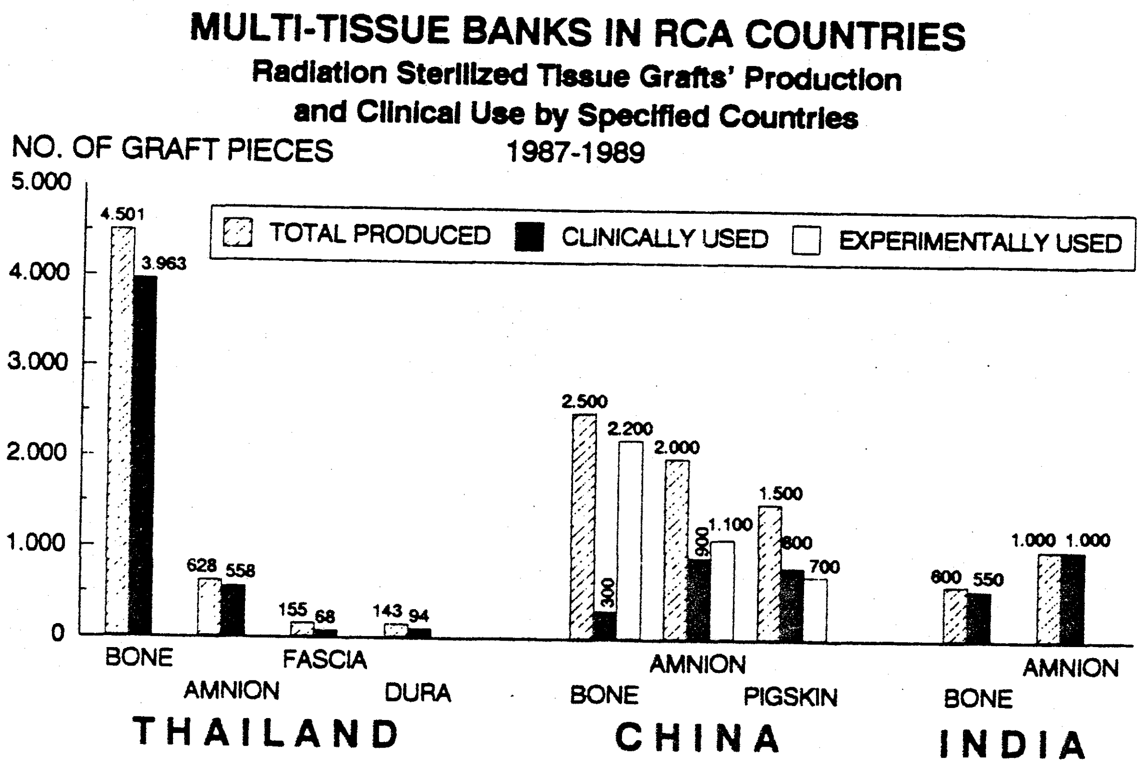


TABLE I

SOME RCA COUNTRIES' MULTI-TISSUE BANKING FOR RADIATION-STERILIZED ALLO- AND XENO-GRAFTS USED IN CLINICAL/SURGICAL AND EXPERIMENTAL (R & D) PURPOSES (1987-1989 DATA)

Developing RCA country and tissue banking	Types of radiation-sterilized grafts produced	Total produced (pieces)	Sterile grafts used in clinical/ surgical cases (units and %)	Grafts experimentally used in R&D (pieces)
Thailand (Bangkok Biomaterial Centre, Siriraj Hospital, Bangkok)	Bones*	4501	3963 (88%)	538 (12%)
	Amnion	628	558 (89%)	70 (11%)
	Fascia	155	68 (44%)	87 (56%)
	Dura	143	94 (66%)	49 (34%)
China (CIRP Tissue Bank, Taiyuan, Shanxi)	Bones*	2500	300 (12%)	2200 (88%)
	Amnion	2000	900 (45%)	1100 (55%)
	Pigskin (xenograft)	1500	800 (53%)	700 (47%)
India (Tata Memorial Hospital Tissue Bank, Bombay)	Bones*	600	550 (91%)	50 (9%)
	Amnion	1000	1000(100%)	-

* Bones: includes different types, such as femur, tibia, fibula, iliac, knee joint, rib, and also used as crushed/powdered bone, AAA bone, etc.

FIGURE II

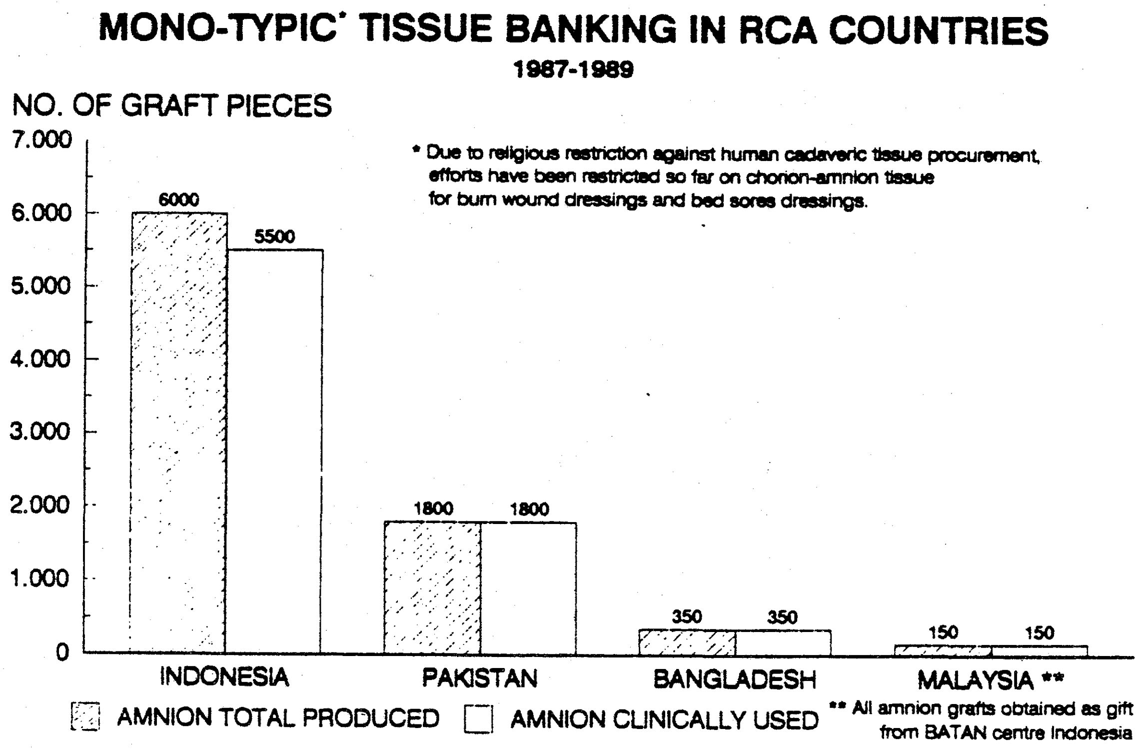


TABLE II

RCA COUNTRIES INDIGENOUSLY PRODUCING SINGLE-TISSUE GRAFTS STERILIZED BY RADIATION FOR CLINICAL USE

Developing RCA countries	Type of radiation-sterilized grafts produced and clinical use	Total local production (pieces per year)	Using other sterile graft types (gifts from other tissue banks)
Indonesia (BATAN Centre, Jakarta)	Amnion (as burns wound dressing; for bed sores)	ca. 6000	Bones, dura and fascia (limited-scale study)
Pakistan (Atomic Energy Hospital, Jamshoro)	Amnion (as above)	ca. 1800	Nerve, bone, dura and fascia
Bangladesh (AEC and Children's Hospital Burns Unit)	Amnion (as above)	ca. 350	Calf bone, fascia and dura
Malaysia (AEC and Puspati and Kota Baru Hospital Burns Unit)	Amnion	ca. 150	Calf bone
Philippines (General Hospital and AEC Nuclear Institute, Quezon City)	Amnion	-	Bones

Project: Maintenance of Nuclear Medical Instruments

Technical Officer: Ms. A. Benini

Participating countries: All RCA developing countries

Objective:

The project comprises the CRP "Care and Maintenance of Nuclear Medical Instruments" and the related TC project "Nuclear Instrument Maintenance". The objectives of the multi-year project is (i) to establish a systematic basis for the preventive maintenance and quality assurance of nuclear medical instruments, and (ii) to strengthen infrastructures in nuclear instrument maintenance and repair through national and regional maintenance efforts. The project implementation follows the recommendations of the Project Formulation Meeting, BARC 1988.

Main activities 1989:

i) Expert visits to a number of RCA countries

ii) Co-ordinated Research Meeting, Indonesia

iii) National Training Course on Nuclear Instrument Maintenance, INMOL Lahore 30 October - 12 November 1989

iv) Advisory Group Meeting on "Use of Personal Computers in the Quality Control of Nuclear Medicine Equipment" Vienna, 11-15 December 1989. (Meeting summary and recommendation attached)

Activities 1990

i) Regional RCA Workshop on the Maintenance of Nuclear Medical Instruments, BARC, 15 January - 2 February 1990 (Indian funded, prospectus attached)

ii) Expert visits

iii) Regional Workshop.

REPORT

of an Advisory Group Meeting on
"Use of Personal Computers in the Maintenance and
Quality Control of Nuclear Medicine Equipment"
Vienna, 11-15 December 1989

SUMMARY

The Advisory Group met to discuss issues of maintenance and quality control of nuclear medicine equipment.

The status of an existing computer program for preventive maintenance (CMPM) was reviewed and considered against the additional needs of overall maintenance and quality assurance in nuclear medicine.

It was felt that the program must be extended to include the comprehensive functions of inventory, maintenance and quality assurance. Moreover, the critical interdependency of these factors must be reflected in the expanded program that is suggested to be called "Computerized Maintenance and Quality Assurance" (CMQA) of nuclear medicine instruments. The overview of the set of the functional specifications for the CMQA program is included in this report and will be subsequently reexamined and focussed by the Agency. A full set of technical specifications can be developed following the elucidation of the complete set of functional specifications.

The Advisory Group strongly recommended the continued utilization of existing international external programs and regional resources, as well as a thorough study of external programs and integration of methods where appropriate. This proposed CMQA and the interagency cooperation in distribution, training and implementation should improve the quality of utilization of nuclear medicine instrumentation and reduce breakdowns.

7. Specification for a comprehensive program of CMQA

A functional representation of the new program Computerized Maintenance and Quality Assurance (CMQA), is shown in Fig. 2. Suggested menu screens for this program are shown in Appendix 5. This should be written in a dBase-compatible language, as it may incorporate modifications of several modules of CMPM as well as possibly take advantage of existing data bases.

8. Conclusions and recommendations

- The Group has reviewed the Agency's computer program CMPM and finds it a useful aid to the management of preventive maintenance in the maintenance group of hospitals and research institutes. But some changes are required (first of all a more friendly use). CMPM is however four years old and could be improved.

- Aspects of an expanded program would also be useful for managing quality control work in nuclear medical departments. This would be of real value to the Agency as a means of improving the utilisation of the very expensive equipment it supplies to such departments in developing countries.

  It is recommended that the IAEA should collaborate with other agencies such as WHO, UNIDO, EEC, AAPM NEMA and eventually others.

- Develop a set of functional specifications for the development of a comprehensive computer based program for inventory, maintenance and QA functions of Nuclear Medicine instruments. This program should use modular-branching approach which expands to level of support required.

- Study methods used in institutes such as the Measuring Instrument Service of the Hungarian Academy of Sciences (MMSZ) to set up regional offices for assistance in training, maintenance and spare part procurement.

- Develop plans for the implementation, training and maintenance of any programs distributed to the field. Necessary Agency support, budget, and infrastructure must be developed to assure distribution, training, utilization and maintenance of these programs. It is anticipated that in approximately one year, the Beta-version of the new program could be tested by laboratories such as Seibersdorf and BARC, and selected field sites. It is recognized that the Agency will strive to utilize resources from its programs in the developing countries. The program should then be reassessed.

- Add modern computer network capability, for two-way exchange of information between participants in IAEA programs to enhance their use.

- Keep in mind important standards such as ISO 9000, ACR/NEMA (standard interface) etc. A review of existing programs and communication standards should be made.

- Insist that manufacturers would supply manuals, and information about spare parts, and maintenance schedules, in digital form on diskettes. In this way, rapid accurate distribution of key information may result.

- Consider the role for IAEA laboratories such as Seibersdorf and BARC to support and monitor such programs worldwide and regionally. Particularly important is the help they can offer in acquisition of spare parts and high level expert support.

Prospectus

Title: REGIONAL (RCA) WORKSHOP ON MAINTENANCE OF NUCLEAR MEDICAL INSTRUMENTS

Place: Bhabha Atomic Research Centre (BARC), Bombay, India

Date: 15 January - 2 February 1990

Deadline for nominations: 30 November 1989

Organizers: International Atomic Energy Agency in Co-operation with the Government of India through the Bhabha Atomic Research Centre.

Language: English

Participation: The workshop will be open for 10 participants from RCA Member States within the Asia and Pacific region.

Participants' qualifications: Candidates shouls have experience in the operation/ maintenance of nuclear medical instruments or have a diploma in electronics physics or a degree in physics.

Purpose of workshop: The purpose of the workshop is to, by lectures, practicals and scientific visits, impart formal training in the maintenance management of nuclear medical instruments.

Programme of workshop: The programme of the workshop will include:

- Basics of nculear electronics
- Principles of operation and quality control of nuclear medical instruments
- Familiarisation with modern equipments used for medical diagnosis
- General problems in nuclear medical systems.
- Preventive maintenance methods and calibration procedures
- Requirements of power conditioning, air-conditioning for trouble free operation
- Role of equipment standardisation, documentation and operational history records
- Spares inventory control and management
- Trouble shooting techniques
- Test instruments for minor repair
- Computer aids for maintenance planning, management and training.

Application procedure: Nominations should be submitted in duplicate on the standard IAEA nomination forms for training courses. Completed forms should be endoresed 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 November 1989. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered.

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

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

Mr. B.R. Bairi
Head, Electronics Division
Bhabha Atomic Research Centre (BARC)
Trombay
BOMBAY 400 085
India

Telex: 117 1017 BARC IN

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, defray the cost of the participants' air travel from their home countries to India and back, as well as a stipend sufficient to cover the cost 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 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.

1. Programme Title

Asian Regional Cooperative Project on Food Irradiation with Emphasis on Process Control and Acceptance (RPFI Phase III)

2. Project Officer

Mainuddin Ahmed

3. Participating Member States

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

4. Background and Objectives

The results obtained in the first phase of the Asian Regional Co-operative Project on Food Irradiation (RPFI - Phase I) 1980-1984, encouraged to initiate Phase II of this programme with the objective of transferring this technology to commercial applications. The RCA countries such as Australia, Bangladesh, China, India, Indonesia, Republic of Korea, Malaysia, Pakistan, Philippines, Thailand and Vietnam participated in the RPFI - Phase II, 1985-1988. During this period most of the countries approved food irradiation processing. Pakistan and the Republic of Korea established commercial facilities, and demonstration facilities were complete in Thailand and Malaysia. Facilities are under construction in Bangladesh and Vietnam, and India has decided to establish two food irradiators. Indonesia has also planned to establish commercial irradiators.

The project Committee Meeting of RPFI - Phase II convened in Kuala Lumpur, 7 - 9 October 1987, requested the IAEA to approach certain donor Governments/Organizations to support the next phase of RPFI in order to achieve technology transfer in the RCA countries. The IAEA submitted the Project Food Irradiation Process Control and Acceptance to the UNDP for support and received approval. The major emphasis of Phase III of the RPFI is to assist national authorities in developing Member States party to the RCA to ensure an effective technology transfer on food irradiation to local industry. A direct involvement of the food industry in pilot-scale R&D to demonstrate the efficacy of food irradiaiton technology, is a prerequisite. Assistance will also be provided to these national authorities in training operators/supervisors of irradiation facilities and food inspectors on proper process control of food irradiation on practical scale and facilitating acceptance of the process in trade. Special emphasis will also be made on harmonizing regulations/legislations on food irradiation based on the Codex General Standard for Irradiated Foods.

5. Major Activities 1989*

A Co-ordinated Research Programme (CRP) on the Asian Regional Cooperative Project on Food Irradiation with Emphasis on Process Control and Acceptance has been implemented in 1989 in order to carry out the following activities:

- Commercial/semi-commercial irradiation of selected foods,

- Local test marketing of irradiated foods,

*) A report on the Chinese funded Regional Workshop, Commercialization of Food Irradiation, Shanghai, 8-12 January 1990 is attached.

- Transportation trials and test export marketing of irradiated foods and

- Demonstration of technical and economic feasibility of irradiated selected foods.

Bangladesh, China People's Republic of, India, Indonesia, Republic of Korea, Malaysia, Sri Lanka, Thailand and Viet Nam are participating in this CRP.

6. <u>Proposed Activities 1990</u>

i. <u>Research Co-ordination Meeting:</u>

The first Research Co-ordination Meeting of the CRP will be held in Bombay, India, from 19 - 23 March 1990. Invitation letters have been sent to the participants of the RCA Member States to participate in this Meeting. The objective of this meeting is to make a plan of activities for the next four years of the project (1990-1993).

ii. <u>Workshop on Techno-economic Feasibility of Using Electron vs. Isotopic Sources:</u>

A Workshop has been scheduled in Takasaki, Japan, from 22 October to 2 November 1990. Twelve participants from RCA Member States will be invited to attend this Workshop.

7. <u>Current approval Period: 1990 - 1993</u>

<u>Work Plan and Budget</u>

		1990	1991	1992	1993
1.	Coordinated Research Programme on Food Irradiation with Emphasis on Process Control and Acceptance	60,000	60,000	60,000	60,000
2.	Research Coordination Meeting	28,000	30,000	34,000	36,000
3.	Training Workshop (two weeks each)	30,000	35,000	35,000	40,000
4.	Experts	30,000	31,000	32,000	10,500
5.	Mission Costs				20,000
6.	Miscellaneous	5,000	4,500	4,500	4,500
	TOTAL	153,000	160,500	165,500	171,000

<u>Grand Total (UNDP Contribution) US$ 650,000</u>

RAS/5/020 Food Irradiation Process Control and Acceptance

Regional Workshop: Commercialization of Food Irradiation, Shanghai, 8-12 January 1990 (Chinese funded).

REPORT

1. I travelled to Shanghai, People's Republic of China from 8 to 12 January 1990, to serve as Scientific Secretary and a lecturer of the RCA Workshop on Commercialization of Food Irradiation. The Workshop was sponsored by the Government of China as its special contribution to RCA. It was held at Jin Sha Hotel, Shanghai. Eleven participants from Bangladesh, India, Indonesia, Republic of Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam attended the Workshop at the expenses of the Chinese Government. In addition, three participants, some 30 observers from China and one observer from Japan also attended. The IAEA through its Technical Co-operation Programme provided four lecturers for the Workshop.

2. The objective of the Workshop was to assist the national authorities in Asia in planning proper implementation of food irradiation on a commercial scale. Special emphasis was given to the specific needs of the region, i.e. need of food industry, need for consumer evaluation and information, need for irradiation as a quarantine treatment and as a method to ensure hygienic quality of food and need for proper control of irradiation facilities and the process.

3. The Workshop was opened by Dr. Liu Zhen-yuan, Vice-Mayor of Shanghai. Mr. G. Sneyer of the FAO Office, Beijing and myself also made statements at the Opening on behalf of FAO and IAEA, respectively.

4. A number of lectures on various topics related to the objective of the Workshop were presented by the four lecturers. Each participant presented a status report on developments leading to commercial application of food irradiation in their countries. Specific problems in each country were discussed in detail.

5. A summary report addressing the needs of various sectors for implementing food irradiation was adopted by the participants. The participants also made recommendations to the governments, food industry and trade, regional co-operation and international organizations, concerning follow-up actions required for the region..

6. While in Shanghai, I discussed with Mr. Sneyer and Mr. Wu Hong Hua of Jianou County Irradiation Center, Fujian Province, the status of construction of a demonstration irradiator partially supported by FAO under TCP/CPR/6763. It appears that the Jianou County Irradiation Center is facing difficulties raising the necessary funds for completing the construction of the facility at present. Thus, the installation of the irradiator and the Co-60 source will have to be delayed until the construction of the building is completed.

Project:

Regional UNDP Project for Asia and the Pacific (RCA) on Increasing the Yields and Nitrogen Fixation Capabilities of Common Grain Legumes.

Project Officer: S. Danso

Participating Countries:

Bangladesh, China, India, Republic of Korea, Malaysia, Pakistan, Philippines (subject to confirmation) Sri Lanka, Thailand.

Funding: UNDP

Background and Objectives:

Grain legumes are a major source of protein and oil in Asia. Nevertheless, because of low yields, interest in their cultivation is low and has thus led to scarcity. The situation needs to be redressed. Achieving the full potential of legumes is very important in sustainable agricultural production systems, as they can easily and very profitably be incorporated into highly productive mixed cropped farming systems. Capitalizing on efficient management of atmospheric nitrogen fixation is the key to this.

Major activities 1989:

Defining the Co-ordinated research programme and the letting of research contracts.

Major activities 1990

Co-ordinated Research Meeting and Workshop on Induced Mutations for Improvement of Grain Legume Production, Faisalabad, Pakistan, April.

Annex 24

The Use of Nuclear Techniques to Improve Domestic Buffalo Production in Asia - Phase II

Project Officers: Drs. M.C.N. Jayasuriya and B.M.A.O. Perera

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

Project:

Buffalo production has a crucial role to play in the rural farming systems of Asia. The region contains some 120 million water buffaloes, which provide draught power, milk, meat, hides and other by-products to the millions of peasant farmers. The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture initiated a multidisciplinary coordinated research programme in 1978 with the aim of improving the productivity of the domestic buffalo in Asia. The project terminated in 1978 but, in view of its success, the programme was extended to Phase II. In the latter phase, studies were initiated on the interrelationships between climate, management and nutrition on reproduction and diseases, and resulted in the development of methods for alleviating some of the factors which limit buffalo production.

Major activities - 1989:

The final Research Coordination Meeting of the programme was held in Rockhampton, Australia from 20-24 February 1989. The proceedings of the meeting, comprising 18 scientific papers, recommendations and conclusions, were technically edited and have been submitted for publication as a Panel Proceedings Series of the IAEA. The programme has now been terminated.

Proposed Activities - 1990:

Completion of publication of the proceedings.

Regional Training Course on "Application of Immunoassay and Related Techniques in Studies on Animal Production and Disease Control in Asia"

Project Officer:	Dr. B.M.A.O. Perera
Participating Member States:	The course is open for 20 participants from the Asia and Pacific region, engaged in research on animal production and health.
Background of the course:	Improvement of animal productivity in developing countries requires knowledge of the specific constraints operating under different environments and management systems. New techniques for measuring reproductive hormones (solid-phase RIA) and for diagnosing important livestock diseases (ELISA) are simpler, cheaper and more accurate than those currently being used. Introduction of these into national research, teaching and extension systems will strengthen the capability of countries in this region to overcome the problems of low fertility and disease which limit productivity of livestock.
Purpose of the course:	To train young scientists in the region in the use of (a) the radioimmunoassay (RIA) technique for measurement of reproductive hormones and related methods for studies on animal reproduction, and (b) the enzyme linked immunosorbent assay (ELISA) technique for diagnosis of diseases and related methods for sero-epidemiological studies. (Note:- the course will have two parallel streams of training, one dealing with reproduction and the other with disease diagnosis.)
Location:	Centre for Application of Isotopes and Radiation, National Atomic Energy Agency (CAIR-BATAN), Jakarta, Indonesia.
Date:	24 September to 19 October 1990
Language:	English

INTEGRATED CONTROL OF PLANT VIRUSES WITH NUCLEAR TECHNIQUES

Project Officer: A. Micke

A co-ordinated research programme under the title "Control of Tropical Plant Viruses in Asia and the Pacific Region with the Help of Nuclear Techniques" was approved by the 189th CCSS subject to the availability of funds.

A project preparation meeting was organized in August 1989 at Tsukuba (Japan) in conjunction with the SABRAO Congress, financially supported by the Japanese Government. Participants from Japan, Thailand, China and Malaysia agreed on details of work plan and co-operation. The project is ready to start as soon as funds are made available.

Project Formulation Meeting for the Regional Agreement for Research Development and Technology Related to Nuclear Science and Technology (RCA) of IAEA in Particular to the Project

"Control of Tropical Plant Viruses in Asia and the Pacific Region with the Help of Nuclear Techniques"

21-25 August 1989
TSUKUBA

Tropical Agriculture Research Center
1-2 Owashi, Tsukuba

Project Formulation Meeting for the Regional Co-operative Agreement for Research Development and Training Related to Nuclear Science and Technology (RCA) in particular to the Project entitled: "Control of Tropical Plant Viruses in Asia and the Pacific Region with the Help of Nuclear Techniques"

21-25 August 1989 at Tsukuba

INTRODUCTION

Elusive plant pathogens such as viruses, viroids and mycoplasma-like organisms pose a great threat to agriculture of developing countries, especially in the tropics. In an effort to deal with problems caused by these pathogens, efficient and reliable methods of indexing these organisms are required. Pathogen-free propagation using in-vitro culture has been attempted for many vegetatively-propagated crops. International exchange of germplasm has been encouraged to promote crop breeding. However, cleanliness of the exchanged materials should be assured. Seed-borne pathogens as well as those carried by vegetative organs are a potential threat to the quarantine system. The development of a method of assay of pathogens with a long latency or with synergistic effects could facilitate the selection and evaluation of breeding lines. Application of these modern techniques to the pathogens causing problems in developing countries should be sought through international co-operation.

As it was thought mandatory for the Joint FAO/IAEA Division to promote the development of technology using nuclear techniques related to biotechnology to solve the problems in agriculture, the plan of a project entitled "Integrated control of tropical plant viruses with nuclear techniques" was proposed at the 10th Working Group Meeting of RCA, Beijing, 11 - 14 April, 1988 and approved in principle. A preliminary meeting was held in August 1988 in conjunction with the Fifth International Congress of Plant Pathology in Kyoto. Recommendations urging the implementation of the programme through regional international co-operation were formulated. In this regard, the FAO/IAEA Co-ordinated Research Programme for the project entitled Control of tropical plant viruses in Asia and the Pacific Region with the help of nuclear techniques was established to be implemented, subject to funds becoming available. Ten research projects have been proposed from institutions of RCA Member States.

The present Project Formulation Meeting aims at identifying in the problems and the measures to be taken to solve the problems in transferring technology needed for the purpose of the programme to developing countries of Asia and the Pacific Region. Researchers from three institutions which have applied for participation in the programme will be invited to Tsukuba. The participants will visit some laboratories of MAFF institutions and Nodai Research Institute, Tokyo University of Agriculture to observe the laboratory facilities as well as to hold discussions with researchers. Through these activities and group discussions, the meeting will formulate the Research Programme with realistic work plans from participating institutions as examples.

The meeting is planned to be held in parallel with the SABRAO Congress (Society for the Advancement of Breeding Researches in Asia and Oceania). It is expected that the contribution from the participants in the congress interested in the topics will generate active discussions.

The meeting is supported by the special contribution to IAEA from the Japanese government and hosted by the Tropical Agriculture Research Center, Ministry of Agriculture, Forestry and Fisheries of Japan.

21 August, 1989

Nobuo Murata
National Institute of Agrobiological Resources
Tsukuba, Japan

Conclusions

The Meeting was organized 1) to identify advanced techniques required to index elusive plant pathogens such as viruses, viroids and mycoplasma-like organisms in the Region, 2) to evaluate the project in taking the infrastructure of the research institutes into consideration, 3) to establish tentative work plans to be implemented subject to the funds of the programme becoming available, and 4) to develop possible collaboration of research for the purpose.

Three participants were invited, each representing institutions proposing a research plan in the Co-ordinated Research Programme for the project entitled "Control of Tropical Plant Viruses in Asia and the Pacific Region with the help of Nuclear Techniques"; Mr. Jin Su, Institute for Application of Atomic Energy, CAAS, China, Ms. Nualchan Deema, Plant Pathology and Microbiology Division, DOA, Thailand, and Dr. Norani Abdul Samad, Department of Biochemistry and Microbiology, Universiti Pertanian, Malaysia.

In the introductory session scientists working on similar areas in the institutions of MAFF in Tsukuba, Dr. Ikegami, Tokyo University of Agriculture, and the three participants from abroad presented the background of their research (Document A 1-3). The Institute for Application of Atomic Energy, CAAS, in Beijing in collaboration with several institutions in Beijing and other provinces, have already initiated studies to develop and use cDNA probes of plant virus and viroid genomes in indexing those pathogens.

cDNA of barley stripe mosaic virus (BSMV) has been established and the use of synthetic probes in the indexing of potato spindle tuber viroid is ready for application. Many other viruses and viroids are under investigation in the IAAE, namely broad bean wilt v., cucumber mosaic v., mungbean yellow mosaic v., peanut mosaic v., peanut mottle v., peanut stunt v., rice ragged stunt v., soybean mosaic v., soybean yellow mosaic v., sesame yellow mosaic v., strawberry v., tomato mosaic v., etc. A plan for further studies on soybean mosaic virus was presented.

Infrastructure of this institute is well suited to research of this kind. Radio-isotope research facilities are available. However, some additional equipment is required to facilitate the research. This institute is expected to play a role of central organization in using isotopes in this type of research. Soybean mosaic virus, for example, poses a great threat to agriculture all over this large country. A large national network system for the establishment of an efficient indexing method will make a great impact on the national economy. Collaboration with institutions abroad through the IAAE will be of great value.

Universiti Pertanian Malaysia presented the situation of viral diseases in Malaysia. Situated in southeast Asia Malaysia has many plant virus problems in common with Thailand.

However, the problems depend on the area in the respective countries. Papaya ring spot which is destructive in Northeast Thailand is not observed in Malaysia and its introduction is considered to be a potential threat to this country. Possibility of introducing new diseases along with the introduction of rubber germplasm from South America is also feared.

With strong support from the Malaysian government, the Universiti Pertanian Malaysia in collaboration with MARDI is now promoting studies of plant viruses at the molecular level. Some of the staffs are already trained for this type of research. Budgetal situation has been improved these years and the university is ready to start the studies. However, some useful equipment is still required. This institute has proposed a Technical Co-operation Project on the same subject to IAEA to upgrade it infrastructure.

Plant Pathology and Microbiology Division, Department of Agriculture, Thailand presented its activities in crop breeding for virus resistance partly based on mutation induction. Recently the propagation of pathogen-free stocks of vegetatively-propagated crop plants has also been promoted activily. Efficient and reliable methods for indexing viruses are urgently needed for these activities.

In relation to these activities. The development of efficient methods for indexing viruses and other elusive pathogens are urgently needed. Through the national and international research activities focussing on viruses in this country, basic facilities for plant virus research in DOA, Bangkok, have been improved in recent years. Staffs trained in molecular biology are also available. Ms. Nonglak Sarindu, who proposed the project, is currently under training in this area. Outside of DOA, the Office of Atomic Energy for Peace has staffs and facilities that can be used for national projects relating to radio-isotope research. However, radio-isotope research facilities in DOA which were originally designed for inorganic and soil chemistry need to be improved so that biochemical studies can be carried out in a more controlled environment. Training of additional staffs is also necessary.

Participants from abroad visited the following laboratories to collect information for further activities: Department of Molecular Biology, National Institute of Agrobiological Resources (F. Motoyoshi, Y. Nozu, M. Hidaka, N. Murata, M. Tomiyama, H. Osaki, from Fruit Research Station), National Agriculture Research Center (H. Hibino and T. Senboku), National Institute of Animal Health (J. Hashimoto) and the Nodai Research Institute, Tokyo University of Agriculture (M. Ikegami and C. Cheng). The information obtained is summarized in the Document B.

Based on the observations and discussions, work plans were formulated by the participants as shown in the Document C 1 - 3.

Major points of discussions and work plans are summarized as follows:

1. Importance of collaborative studies in Asia and the Pacific Region on the control of plant viruses with the help of nuclear techniques was confirmed. Many pathogens existing in the counties and those not existing but posing a potential threat should be studies.

2. Basic infrastructure of research is available in the institutions participating in the present meeting. However, upgrading of the conditions will markedly promote the development of research.

3. Collaboration through the exchange of information and materials will be highly beneficial. For example, exchange of cDNA clones and synthetic probes for testing their applicability will be beneficial both for the donors and recipients. As for the potential threat of introduction of pathogens, exchange of information is important.

4. Research groups in Australia and the Philippines are enjoyed in collaborative studies on cadang-cadang disease of coconut and other viroid diseases are important sources of information. Their cooperation is anticipated.

5. Structure of project in each institute in coming years is summarized as follows:

i. Project in China will consist of a large number of collaborative studies among institutions within the country. IAAE will play the role of a central organization. Research will be initates by the preparation of cDNA probe of soybean mosaic virus based on the ongoing research.

ii. Project in Thailand will start with attempts to detect pathogens with dot hybridization using the probes supplied from elsewhere. Probes of gemini virus group or some mycoplasma-like organisms may be tested for their applicability to the pathogens in Thailand. Cotton leaf roll virus, which is difficult to purify, will be studied for producing cDNA clones. Technical transfer will be sought through exchange of researchers.

iii. Project in Malaysia will focus on the production of cDNA clones of viruses important for the quarantine system and pathogen-free propagation. Papaya ringspot virus, tomato mosaic virus, cadang-cadang viroid, tobacco leaf curl virus, rice viruses and Odontoglossum ringspot virus will be the primary targets. Research will be conducted in collaboration with MARDI.

6. Radio-isotope research facilities in the institutes listed above, except for those in the central organizations, may not match sufficiently the safety standards. The situation should be inspected by experts and measures be taken to improve the situation.

7. To upgrade the infrastructure of the research institutions, Technical Co-operation should also be considered. This type of support together with the Co-ordinated Research Programme will be effective in promoting the research.

8. In addition to the participants from the three institutions invited here, Research Contract proposals have been submitted to IAEA from institutions in Vietnam as well as several others institutions in the People's Republic of China along with two Research Agreement Proposals from Japan (Hokkaido University, Saga University), and one Research Agreement each from Australia (Waite Agriculture Research Institute) and ICRISAT. Regional international research system involving international as well as national institutions will facilitate the development of techniques to control the elusive plant pathogens in this region.

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UNITED NATIONS DEVELOPMENT PROGRAMME

Date: 1989-03-08

PROJECT FORMULATION FRAMEWORK

Region: Asia and the Pacific

Project no. ______/ /______

Proposed title: Regional Programme to Strengthen Research on Animal Production and Disease Diagnosis in Asia through Application of Immunoassay Techniques

Estimated duration: 5 years

Tentative UNDP + cost-sharing contribution: US$2,475,000

Estimated counterpart costs: US$2,250,000

Sources of funds (IPF, SMF/LDCs, cost sharing, other): Cost Sharing

A. Development problem(s) intended to be addressed by proposed project:

1. At macro level:

Asia is endowed with considerable animal wealth but the contribution of livestock to most Asian economies is not commensurate with the number of animals or the extent of land resources used. Animal productivity is essentially very low and if this situation is to be improved there will need to be improvements in reproductive efficiency, nutrition, and in the diagnosis and control of those viral, bacterial and parasitic infections which are endemic to the region. However it must be said that the major problem in much of Asia is that insufficient basic information exists on how well indigenous breeds of livestock perform within the environments in which they exist and therefore an important prerequisite to improving the Asian livestock situation must be the initiation of simple integrated studies on the reproductive efficiency, nutritional and disease status of different genotypes kept by small farmers in different environments.

2. At micro level:

Enhancement of research in Asian universities and research institutes directed toward improving the productivity of indigenous livestock. The research will initiate and stimulate through the application of nuclear and other advanced methods, studies on the nutrition, diseases and reproductive performance of cattle, buffaloes, sheep and goats with the ultimate aim of increasing productivity through improved management practices derived from research findings.

B. Concerned parties/target beneficiaries

1. Party identifying project:

At a recent FAO/IAEA Consultants Meeting to advise on future strategies for assisting developing Member States, as well as at a Research Coordination Meeting of scientists from Asian countries engaged in livestock research and development, it was recommended that regional programmes of a multidisciplinary nature (i.e. involving reproduction, nutrition and diseases of animals) should receive high priority, and that immunoassay methods would be essential for obtaining the type of information required to solve problems.

2. Target beneficiaries (by gender, if appropriate):

Initially, research institutes and universities in Asia, through development of capabilities to conduct research using nuclear and related techniques on problems relevant to small-farm animal production. Subsequently, the rural farming communities who use livestock for draught power, meat and milk production.

C. Pre-project and end of project status

1. The pre-project situation:

Some expertise exists within the region for conduction immunoassay techniques for studies on animal reproduction and diseases. This has been built up by previous programmes of the IAEA and Joint FAO/IAEA Division, through various Coordinated Research Programmes and Technical Cooperation projects. Some work has also been initiated on the applications of these methods for obtaining information on constraints operating under specific situations. There is now a need for greater coordination and interaction within this pool of resources in order to address common regional problems.

2. The situation expected at the end:

(i) The ability to conduct immunoassays (RIA and ELISA methods), for studies on reproduction and disease diagnosis on a wider scale, and to apply these for identifying field problems of importance.

(ii) The expertise necessary to test possible methods for overcoming these problems, using practical, acceptable and sustainable technologies.

(iii) Greater interaction and self-reliance within the region in research and development on appropriate livestock production strategies.

D. Special considerations

1. Special considerations and their influence on either the content or form of the project:

This project will encourage collaboration between research workers and field extension personnel, and will address problems faced by a segment of the farming community most urgently in need of economic upliftment. The research projects will rely heavily on feedback from actual farming situations, and will thereby develop greater understanding among the research workers of the region on rural farming systems, and their strengths and weaknesses.

2. Negative impact of project:

Ruminant animals do not compete with man for food resources, and also provide organic manure which improves soil fertility. No negative impact is foreseen.

E. Other donors, programmes active in the same subsector

FAO, Australian Council for International Agricultural Research (ACIAR), Swedish Agency for Research Cooperation (SAREC), Overseas Development Administration of the UK (ODA), International Development Research Centre of Canada (IDRC), and the Governments of the Netherlands, Federal Republic of Germany and Japan. However, these activities are carried out on a bilateral as opposed to a region basis, with little or no interchange of methods, results etc.

F. Development objective and its relation to the regional programme

The developing Member States party to the RCA have shown considerable interest in promoting animal production within the region, as evidenced by their support of a recently concluded FAO/IAEA Buffalo Development Programme. This proposal aims to widen the scope of immunoassay techniques for improving production in a number of ruminant livestock species.

G. Major elements

Immediate objective One:

To establish and validate immunoassay techniques (RIA, ELISA) and labelled DNA probes to examine reproductive efficiency and to diagnose diseases and monitor control programmes. Most emphasis would be given to FMD, brucellosis, Aujezsky's disease and trypanosomiasis.

Outputs	Activities	Party responsible for the activity
1.1 Ability to conduct specific immunoassays for studies on reproduction and disease diagnosis.	1.1.1 Meeting to discuss and coordinate work plans, training workshop for participants.	FAO/IAEA with counterparts, Ministries of Agriculture, and experts.
	1.1.2 Specialised training and technical back-stopping.	FAO/IAEA with experts
	1.1.3 Provision of standardised reagents and kits from FAO/IAEA laboratory at Seibersdorf.	FAO/IAEA

Immediate objective Two

To apply immunoassay techniques in conjunction with conventional methods for identifying the most important causes of lowered poductivity and the relative contributions of poor reproduction, diseases, nutrition and management under specific small-farm conditions.

Outputs	Activities	Party responsible for the activity
2.1 Research results from field surveys and more intensive studies	2.1.1 Research projects	Counterparts with the guidance of FAO/IAEA and experts; Ministries of Agriculture.
2.2 Sharing of knowledge and greater interaction	2.1.2 Coordination Meetings	Counterparts with FAO/IAEA, Ministries of Agriculture

Immediate objective Three

To devise practical technologies which could overcome these limitations, to test them under institutional conditions, and to then conduct field trials on their applicability and acceptability.

Outputs	Activities	Party responsible for the activity
3.1 Results on responses to methods aimed at improving production and controlling diseases	3.1.1 Research projects on small farms	Counterparts; FAO/IAEA; Ministries of Agriculture
	3.1.2 Visits by experts	FAO/IAEA and experts
3.2 Sharing of knowledge between participants	3.1.3 Coordination Meetings	Counterparts; FAO/IAEA; Ministries of Agriculture.

H. Project strategy

1. Direct recipients:

Research workers in universities and government agricultural and veterinary research institutes.

2. Relationship between direct recipients and target beneficiaries:

The research workers would conduct studies on present systems of ruminant production practised by rural small scale farmers. This would involved obtaining information on factors which limit productivity and attempts to alleviate these constraints. This two-way flow of information and close interaction will benefit both parties.

3. Implementation arrangements:

(i) Award of research contracts on cost-sharing basis.
(ii) Supply of equipment, reagents and other requirements.
(iii) Technical backstopping by FAO/IAEA staff and outside experts to assist with validation of immunoassays and conduct of field studies.
(iv) Holding of coordination meetings and group training workshops.

4. Alternative strategies/implementation arrangements considered:

None at present.

I. Host country commitment

1. Evidence of counterpart support, availability physical facilities, sustainability:

Many countries within Asia and the Pacific have shown interest in strengthening their capability to use nuclear and related techniques for improving animal production. Former programmes of the FAO/IAEA in this field have received full support, and have been instrumental in laying down part of the infrastructure necessary for the project proposed here.

2. Arrangements to assure staff trained by the project will remain in their posts:

Involvement in nationally important and relevant research is often very satisfying to the research workers, and the tendency for such scientists to leave their countries is usually lower.

J. Risks

Description of risk	Estimated likelihood of occurrence (i.e. high, medium, low)
1. Factors which may at the outset cause major delays or prevent achievement of the project's outputs and objectives.	
The planning and execution of field level research on small farm animal production systems is often very difficult and time consuming. There is a possibility that in some cases all of the research objectives may not be achieved in time. However, previous experience in the Region has shown that there is a high level of commitment.	Low
2. Factors which could over time cause major delays or prevent achievement of the project's outputs and objectives.	
Unforseen situations can sometimes disrupt research programmes on livestock - e.g. outbreaks of severe disease, causing high mortality or preventing movements of personnel between farms.	Low

K. Inputs

1. Skeleton Budget: For 5 years

		National Inputs (US$ Equiv.)	External Inputs (US$ Equiv.)
(i)	Personnel		
	- National counterparts	1,200,000	-
	- IAEA (Chief Tech. Officer + Travel)	-	500,000
	- Expert services (4 mm/yr/)	-	175,000
(ii)	Sub Contracts (20 Research Contracts)	2,500,000	1,500,000
(iii)	Training Workshops and Coordination Meetings (every 18 m)	50,000	150,000
(iv)	Laboratory support (from FAO/IAEA Laboratory, Seibersdorf)	-	150,000
	Totals	3,750,000	2,475,000

2. Comments on possible project input policy issues:

Person(s) primarily responsible for this formulation framework: ______________
Signature(s)

Name(s): JAMES D. DARGIE
Title(s): Head, Animal Production and Health Section

JOINT FAO/IAEA DIVISION
OF NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE

INTERNATIONAL ATOMIC ENERGY AGENCY
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Annex 27

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IN REPLY PLEASE REFER TO: DIAL DIRECTLY TO EXTENSION:

PRELIMINARY PROJECT PROPOSAL - DISCUSSION PAPER

Title: Regional Asia project on nitrogen fixing trees for increasing soil fertility, crop and fuelwood production.

Summary:

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.

Additionally, some have the problems of desertification.

2. The successful management of nitrogen-fixing trees in agricultural 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.

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31 Aug 89

d. providing fuelwood in areas where it is badly needed.

e. helping the rehabilitation of damaged soils. The tree imput of N and organic matter 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, on a Technical Co-operation basis, i.e., including equipment, training and expert services, is proposed to focus on the management of nitrogen fixation by trees 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 $782,000.

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 Glyricidia 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 and Malaysia. 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.

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, 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 at IAEA in November 1986. 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 N-15 and other isotope and radiation techniques could contribute significantly to the success of this research.

A major Agency role

A number of other agencies are involved in related projects, e.g., ACIAR (Australia) 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. BOSTID-USAID 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). While the importance of such programmes is well recognized (CSC meeting, Lucknow, India, March 1986, CSC Technical Publication Series No. 190), we do not know if these have been implemented. Agroforestry (using nitrogen fixing trees) is a major programme of the International Centre for Research in the Semi-Arid Tropics (ICRISAT), Hyderabad, India. We have had expressions of interest in a trees programme from the People's Republic of China, Malaysia, India, Pakistan, Sri Lanka, Thailand and Vietnam. We are aware of acute interest also in the Philippines and Indonesia.

It is fair to say: (a) there is great interest in such activities in Asia/Pacific Region, (b) present activities by a range of authorities are rather limited, (c) the Agency could make a major impact by: (i) adding the considerable power of ^{15}N and other isotope techniques to existing programmes, (ii) playing an integrating, 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.

The Seibersdorf Laboratory would play 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.

Agency programmes in nitrogen fixing trees in operation in some African countries.

Target beneficiaries

Initially, research institutes and universities in Asia through identification of tree species for establishment of agroforestry systems. Subsequently, the rural farming communities through agricultural extension networks.

The situation expected at the end of the project

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.

FUNDING:

Duration: 5 years

Number of participating countries: 8 - 10

Budget: $819,000

Year	Experts		Equipment	Fellowships		Group meetings	Total
	mm	$	$	mm	$	$	
1991	6	54,000	150,000	6	18,000	30,000	252,000
1992	6	54,000	100,000	6	18,000	-	172,000
1993	6	57,000	90,000	6	18,000	30,000	195,000
1994	4	40,000	90,000	-	-	-	130,000
1995	4	40,000	-	-	-	30,000	70,000
Total		245,000	430,000		54,000	90,000	819,000

Responsible Officers: G.D. Bowen

K.S. Kumarasinghe

Soil Fertility, Irrigation and

Crop Production Section

New Project Proposal
on
The Use of Nuclear Techniques
to Improve Forest Tree Species

March 1990

Kyungpook National University
Republic of Korea

CONTENTS

1. Significance of overall problem

Somaclonal variation in forest tree species regenerated from *in vitro* cultures is considered to be a potential source of genetic variability which can be used in tree improvement. Radiation-induced mutations offer another means of variability from which new genotypes can be selected. The two causes of genetic variability are analysed in the present set of experiments with the aim of assessing their significance for tree-breeding programes.

2. Related work already performed or in progress at other Institutes

Plant biotechnology hold particular promise for the improvement of forest tree species. Biotechnological procedures with direct application to tree improvement include mass clonal progagation, *in vitro* selection utilizing both natural variation and variation induced inculture, somatic hybridization, somaclonal variation and genetic transformation using suitable vactors. Foundamental to these research fronts are successful procedures for the regeneration of mutant and callus *in vitro* culture.

Applications of somaclonal variation have been reported for a number economically important species, including carrot, geranium, tobacco tomato, alfalfa, sugarcane, wheat, rapessed, pepper, rice, oats, corn and potato. The frequency of single gene mutations in tomato can be as high as one mutant in every 20 to 25 regenerated plants. The application of somaclonal variation to tree biotechnology will be forthcoming as new procedures became established which allow regeneration of plants from protoplasts and cell culture(Kirby, 1987).

The variation will be increased in cultured cell treatmented with radioactivity. There are some reports of somaclonal variations by radio-induced variability: in maize (Novak), *Euphorbia pulcherrima* (Kleffel), *Poplar*(Douglas), *Citrus*(Pasqual), *Gerbera jamesonii*(Walther), *Ullucas tuberosus* (Achutegui-Betelu), banana, bean, *Cactacea* species (Hutabarat). Most of studies are concerned with crops and ornamental plant species. Tree species are limitted application of somaclonal variation by radioactivity.

3. Related work already performed or in progress at Institute

Over the past a decade, our laboratory has been developing tissue culture systems for forest tree species. We studied various tree species for plant regeneration from callus, axillary buds, stem, internodes, immature embryo explant and protoplasts.

We reported *in vitro* organogenesis and somatic embryogenesis from punctured leaf of *Populus nigra* x *P. maximowiczii* and x*P. albaglandulosa*. Mesophyll protoplasts of *Populus euamericana* cv. I-214 and callus protoplast of *P. alba* were investigated factors effecting the isolation, culture and plant regeneration. Multiple shoots were regenerated on shoot-tips of *Populus* spp., *Robinia pseudoacacia*, *Ailanthus actissima*, *Salix koreensis*. *Dispyrus kaki*, *Pinus koreansis* and *Pinus densiflora*. Suspended cell culture techniques were established on *Populus nigra* x *P. maximowiczii* and *Robinia pseudoacacia*. Selection for salty tolerance *in vitro* was reported at

Populus nigra x *maximowiczii* and *Pinus densiflora*, *P. thunbergii*, *P. rigida*, *P. taeda*, *P. koraiensis* and x*P. rigitaeda*.

Now we have developed the culture system techiques of various tree species. Studied mutagenesis by radioactivity *in vitro* culture of tree species have not been tried yet in Korea. If the production in mutants are added accumulated tissue culture techniques it will be benefit in the field of forestry breeding programs.

4. References to relevant literature

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5. Scientific scope of the project

(1) Detailed research objectives

Since tree species are involved commonly the out cross pollination system and long-term plants, crossing and selecting breeding which have been very useful for one-year plants breeding are limitted application of tree breeding. Genetic variations by artificially occurring are restrictedly limitted in forest tree because of long-term plants. Mutant breeding is considered to overcome those difficulties in tree breeding. Mutation by mutagens is proved to be very useful tool for the plant breeding, especially for the tree species.

Recently, the plant tissue culture techniques have been progressed rapidly due to the development of genetic engineerings. If we could join tissue culture techniques to radition methods, the great progress will be established by mutant breeding in forest tree species.

The purposes of this study are investigated to the effects of gamma radiation on morphogenesis and mutant formation in cultured explants of *Ailanthus altissima*. Radiation-induced mutants of tree species have not been studied more than crop and horticultural plants. *Ailanthus altissima* Swing L. is very important tree species in Korea; shadow tree, furniture wood, rapid growth in low-nutrient soil. We have been studied in *Ailanthus* species for tissue culture recent years. We have acquired some results of callus, cell suspension culture in *Ailanthus altissima* but have no experience about radiation-induced-mutant in tree species. These attemptance will be good performances for selecting mutation induced radioactivity.

(2) Relationship of these objectives to present knowledge and to other similar projects at Institute or elsewhere

The ability of tree species callus and its stem explants (cultured *in vitro*) to form adventitious buds makes this important genus suitable for experimental induction of mutants by radiation. Early studies reported somatic mutation such as variegated leaves and chlorophyll deficiences in poplar plants after chronic gamma radition (Douglas). Radiation-induced mutations offer another means of variability from which new genotypes can be selected in maize (Novak). Duron reported the Weigela cultured *in vitro* were irradiated with gamma rays at a rate of 10 Gy/h to doses of 20-60 Gy. The effect of treatment on the survival of irradiated buds, on rhizogenesis and on the growth of cuttings were observed in vitro. Reported x-ray-induced mutability in embryogenic suspension cultures of Euphorbia pulcherrima was reported by Kleffel. In model experiments embryogenic cell suspensions of Poinsettia were x-irradiated to induce as high mutability as possible. X-irradiation of immobilized embryogenic cells with doses between 10 and 60 Gy resulted in decreasing survival rates down to 11% (unirradiated control =100%). Chow revealed that effects of gamma rays on winged bean tissue culture *in vitro*. The effects of gamma radiation on somatic embryogenesis and androgenesis was investigated in various *in vitro* cultured tabacco, carrot and datura by Sangwen. Higher radiation doses of 2,000 - 10,000 rad have an adverse, or inhibiting, effect on *in vitro* induced embryogenesis. Hutancarat reported that gamma-ray-induced effects on plant regeneration from callus in *Chinocereus* species. Calli were irradiated with 40, 60, 80 and 100 Gy of gamma rays. The frequencies of shoot regeneration at doses of 0, 40, 60 and 80 Gy of gamma rays were 318, 406, 175 and 69 respectively.

Radiation-induced mutants of tree species have not been studied more than crop and horticultural plants. These attemptance will be good performances for selecting mutation induced radioactivity.

(3) Detailed work plan for first year, including proposed methods or techniques

Callus, suspension cell and multiple shoots of *Ailanthus altissima* will be used in the following experimental procedures;

(A) Induction and growth of callus; Callus is initiated using 5mm stem internodes and punctured leaf on MS basal medium with 3% sucrose and various phytohormones concentrations. Inducted callus is subcultured every three weeks on fresh medium and then investigate fresh weights.

(B) Cell suspension culture; Suspension cell is cultured in liquied modified MS medium. The cell suspensions is growth in the dark in 250 ml flasks on gyratory shaker at 100 rev/min at 25+1°C. Subculturing is done every 10 days. The growth speed of suspension cell is investigated by packed cell volume and then we could select the best cultured medium for suspension cells.

(C) Multiple shoots; Multiple shoots will be investigated the effected on BAP concentrations. Counting the number of shoots, we could find out the fittest BAP concentration for multiplication of shoots.

(D) Irradiation of gamma ray; The source of gamma rays used is 137Cs. The facility consisted of a radiation cell 6.8 Cm in diameter and 15.0 Cm deep. The dosage rate will be treated with uniform throughout the cell. The callus, punctured leaves, suspension cells and multiple shoots are exposed to 0, 1,000, 2,000, 2,500, and 3,000 rad of gamma irradiation in vitro culture.

(E) Investigation of mutation; Potential mutants, such as chlorophyll-deficient shoots, and morphological aberrations in green shoots, such as distorted and elongated leaves, will be recorded after four-five weeks and then plant at the field succeedingly for investigation of mutant characters.

6. EXPERT'S BIODATA

A. GENERAL INFORMATION

1. Full Name	Young Goo PARK (朴 龍 求)
2. Personal Particulars	Sex: male Civil Status: married Date of Birth: 1945, 4, 15 Nationality: Korean Religion: None
3. Designation	Doctor and Professor of Forest Genetics
4. Name of Organization	College of Agri., Kyungpook Natl. Univ.
5. Official Address	# 1370 Sankyup-dong, Buk-Ku, Daegu 702-701, Korea (Tel. No. (053) 950-5747
6. Home Address	# 960-59 Manchon 2-dong, Susung-ku, Daegu 706-022, Korea, (Tel. No. (053) 754-4224
7. Mailing Contact Address	Official Address
8. Emergency Contact Name and Address	# 960-59 Manchon 2-dong, Susung-ku, Daegu 706-022, Korea, (Mrs Hae Lim UOO) Tel. (053) 754-4224

B. RECENT JOB HISTORY

Name of Organization	Nature of Business (Designation)	From	To
Present: Kyungpook National University	Forest Genetics (Dr. & Professor)	'80. 5.	Now
Previous: Institute of Forest Genetics	Tree Breeding (Senior Researcher)	'68.2.	'80.4.
National Institute of Genetics, Japan	Genetic Variation of Natural Forest (Invitated Foreign Scientist; JSPS)	'69. 10.	'71. 9.
Tohoku University, Sedai, Japan	Tissue Culture and Tree Breeding (Exchang Professor)	'84. 12.	'85. 2.
Michigan State Univ. U.S.A.	Gene Conservation and Tree Breeding	'87. 6.	'87. 8.

C. ACADEMIC EDUCATION

Instiute	Major Study	Degree	Year of Graduation
College of Agri. Korea University	Forestry	Bachelor of Agriculture	Feb. 25, 1966
Korea University Hall	Forestry	Master of Agriculture	Feb. 25, 1968
Kyshu University Hall(Japan)	Forest Genetics	Doctor of Forest Gen-etics	May 19, 1974

D. OVERSEAS WORK EXPERIENCE

Country	Nature of Assignment	Used Language	Duration
Japan	Invitated Foreign Scientist	Japanese	'69.10-'71.9.(2years)
Japan	Tohoku University	Japanese	'84.12.-'85.2.(3 month)
U.S.A.	Michigan State University	English	'87.6.-'87.8.(2 month)

List of published research papers by the nominee within four years (1986 - 1989)

1. Park,Y.G. and K.H.Han.1986.Isolation and culture of mesophyll protoplasts from *in vitro* cultured *Populus alba* x *P: glandulosa*. Jour. Korean For. Soc. 73: 33-42
2. Park,Y.G. and S.H.Son.1986. Factors affecting the isolation of mesophyll protoplast from *Populus euramericana* cv. I-214. Jour. Korean For. Soc.14: 29-36
3. Kim,O.R. and Y.G.Park.1986. *In vitro* studies on *Pinus koreansis*.II. Chromosomal variation in the callus. Jour. Korean For. Soc. 74:56-60
4. Park,Y.G. and K.H.Chung.1986. Inheritance of leucine aminopeptidase and glutamate-oxalate transaminase isozyme in *Pinus thunbergii*. Korean J. Genetics 8: 133-140
5. Chung,J.D., D.W.Kim and Y.G.Park. 1986. Somatic hybridization by protoplasts fusion in higher plant-protoplast isolation and culture. Recent Progressin Molecular Biology and Genetic Engineering in Korea. Pro. of the 1st Con. on Molecular Biology and Genetic Engineering Seoul, Korea Oct. 16-17;259-266
6. Park,Y.G. 1986. Plant tissue culture in forest tree breeding. Special Supplement Proceedings of the Symposium for the 40th Anniversary of Kyungpook National University Foundation, Agricultureal Application of Plant Tissue and Its Industrialization; 113-135
7. Park,Y.G. 1986. The Prospects of Biotechnology in Forestry. Symposium; Hi-Technologies in Agricultural Sciences and Coming Agriculture. The Association of Korea Agricultural Science Societies; 79-102
8. Park,Y.G., D.I.Shin, J.H.Woo, I.W.Wul and S.H.Son.1987.Isolation and cultured of mesophyll protoplasts from Populus spp. Sym. Genetic Manipulation of Woody Plants June 21-25(1987), Kellog Center, Michigan State University, East Lansing, Michigan p56
9. Park,Y.G. and S.H.Son. 1987. Culture methods of mesophyll protoplasts from *populus alba*.x *glandulosa*. Pacific Science Association 16th Congress, Seoul
10. Park,Y.G., D.I.Shin, J.H.Woo, I.W.Sul and S.H.Son. 1987. Protoplast isolation from mesophyll of *Populus alba*. Korean J. Plant Tissue Culture 14: 49-54
11. Kim,K.U., Y.G.Park and S.H.Kwak. 1987. Development of useful secondary product through plant cell culture. Recent Progress in Molecular Biology and Genetic Engineering, Seoul Korea Oct. 16-17; 135-142
12. Park,Y.G. and S.H.Son. 1987. Protoplast isolation from callus and suspension cultured cells of *Populus alba*. Korea J. Genetics 9: 133-140
13. Park,Y.G. and S.H.Son.1988. Culture and regeneration *Populus alba* x *glan*-dulosa leaf protoplasts isolated from *in vitro* cultured explant. Jour. Korea For. Soc. 77:208-215
14. Park,Y.G., G.S.Kang and D.I.Shin. 1988. Allelopathic potentials of *Larix leptolepis* on germination of several forest tree species. Jour. Korean For. Soc. 77:17-22
15. Park,Y.G., K.U.Kim and S.G.Lee. 1988. Development of useful products through plant cell fusion and culture - Analysis of useful secondary products in cell suspension culture. Recent Progression Molecular Biology and Genetic Engineering in Korea 1988. Proceedings of the 3rd Con. on Molecular Biology and Genetic Engineering, Seoul,Korea 3: 113-118

16. Park,Y.G., S.H.Son and S.J.Park. 1988. In vitro selection for salty tolerance of Populus nigra x P. maximowiczii. Agric. Res. Bull. Kyungpook Natl. Univ. 6:75-85
17. Park,Y.G. and S.H.Son.1988. In vitro organogenesis and somatic embryogenesis from punctured leaf of Populus nigra x P. maximowiczii. Plant Cell Tissue & Organ Culture 15: 95-105
18. Park,Y.G. and S.H.Son. 1988. Regeneration of plantlets from cell suspension culture derived callus of white poplar (Populus alba L.). Plant Cell Reports 7: 567-570
19. Park,Y.G., D.I.Shin and S.G.Lee. 1989. Secondary products in cell suspension culture of Salix koreansis. Jour. Korean For. Soc. 78(2):198-208
20. Park,Y.G. S.H.Son. 1989. Plant regeration from protoplasts of Populus nigra x P. maximowiczzi leaf mesophyll cultured in vitro. The 6th International Congress of the Society for the Advanced of Breeding Researches in Asia and Oceania, August 21-25,1989, Tsukuba, Japan, pp 141
21. Lee,S.G. and Y.G.Park. Plant regeration from cambium callus of Ailanthus altissima. Jour. Korean For. Soc. 78(4): in press)
22. Chung,K.H., Y.G.Park., Y.W.Chun and E.W.Noh. 1989. Transformation of Populus alba x P. glandulosa. Jour. Korean For. Soc. 78(4): in press)

7. Budget($1=700 won)

Project Year	Salaries & Wages	Expendable Supplies	Travel/ Transportation	Other Costs	Project Total	Requested from the Agency
1st	$3,000	$5,000	$3,000	$3,000	$14,000	$7,000
2nd	$3,000	$5,000	$3,000	$3,000	$14,000	$7,000
3rd	$3,000	$5,000	$3,000	$3,000	$14,000	$7,000
Total	$9,000	$15,000	$9,000	$9,000	$42,000	$21,000

New Project Proposal
on
Applications of RFLP Technology in Fundamental Genetics and Breeding Programms in Crops

1990. 3

Agricultural Sciences Institute
Rural Development Administration
Republic of Korea

New Project Proposal

1. Title of Proposed Project

   Applications of RFLP technology in fundamental genetics and breeding programs in crops

2. General Information

   a. Background

      . Restriction Fragment Length Polymorbhism (RFLP) technology is the use of cloned radioactive labelled fragments of chromosomal DNA as genetic markers.

      . This new technology promises to revolutionize some areas of plant genetics and plant breeding since RFLP probing will likely be one of the first techniques of biotechnology to be incorporated into existing breeding programs and may thus be one of the first to have an impact on plant agriculture.

   b. Objectives

      . Construction of genetic map for selecting desirable genes using easily detectable RFLP markers.

      . Fundamental applications in crop breeding and molecular biology

3. Research procedures

   . Duration : 1991-1995 (5 years)

   . Research strategy

1st year (1991)	:	- Selection of parent plants for RFLPs - Isolation of genomic DNA and construction of gene library
2nd year (1992)	:	- Production of mapping populations - Scoring RFLPs in the mapping population
3rd-5th years (1993-95)	:	- Construction of RFLP linkage maps - Selection of desirable genes using RFLP markers - Fundamental application in breeding and molecular biology

4. Research Institutions

. Agricultural Sciences Institute
. Crops Experiment Station
. Honam Crop Experiment Station
. Yeongnam CroOp Experiment Station
. Horticulture Experiment Station

5. Budget

Institution	Budget for 5 years
IAEA	$ 100,000
RDA, Korea	$ 300,000
Total	$ 400,000

6. Project Leader

Dr. Tae Young Chung
Head
Agricultural Biotechnology Division
Agricultural Sciences Institute
RDA, Suwon, 440-707, Korea
(0331) 292-6215

7. Expected Impacts

The integration of RFLP techniques into breeding promises to :

a. Expedite the movement of desirable genes among varieties

b. Allow the transfer of novel genes from related wild species

c. Make possible the analysis of complex polygenic characters as ensembles of single Mendelian facters

d. In the future, high density RFLP maps may also make it possible to clone genes whose products are unknown, such as genes for disease resistance or stress tolerance

Annex 30

Project: Research Reactor Utilization

Technical Officer: Mr. R. Muranaka

Objectives:

The objectives of the project were defined at the Project Formulation Meeting, Kuala Lumpur March 1989 as "to promote collaboration among member countries in areas of research reactor operation, management and developmental research, towards optimizing their utilization potential as well as in promoting direct utilization, especially in areas where there exist common problems". As a secondary objective, the project aims to contribute to the infrastructure development of those 6 [incl. Aust?] RCA countries with only one research reactor.

Main activities 1989

i) Project Formulation Meeting, Kuala Lumpur, March 1889 (Full report available)

ii) Formulation and approval of the CRP "Application of Personal Computers to Enhance Operations and Management of Research Reactors".

Main activities 1990

i) Regional Training Course on Research Reactor Safety Principles, BARC, 9-20 April 1990 (Indian Funded) (Prospectus attached).

ii) Regional Workshop on Reactor Technology and Use of Miniature Neutron Source Reactor, Beijing, November 1990 (Chinese funded) draft prospectus attached.

iii) Co-ordinated Research Meeting.

Workshop on Research Reactor Technology and Utilization with Emphasis on Miniature Neutron Source Reactor

Beijing, November 1990

Objective:

To introduce technology and utilization of a safe, economic and useful nuclear tool - miniature neutron source reactor (MNSR), to promote the development of nuclear technology in Asia and Pacific area; and to improve the ability of atomic energy for peaceful use.

Subject:

a) Introduction on research reactors.

b) Study on MNSR's features, structure, physical and thermohydraulic performances and its effects on environment.

c) Application of MNSRs of IAE MNSR, Pakistan MNSR and Shen Zhen MNSR and their development.

d) Analyze samples on geology, biology, environment, or others which shall be brought to Beijing by participants.

e) Visit HWRR and SPR in IAE.

f) Presentation on national development programme of research reactors by each participant.

Place: Institute of Atomic Energy (IAE), Beijing, China.

Working language: Engligh

Duration: five working days

Number of participants: 13. 10 from RCA Member States plus 3 from Ghana, Syria and Iran.

Finance: Chinese extra-budgetary contribution to RCA.

Prospectus

Title: REGIONAL (RCA) TRAINING COURSE ON RESEARCH REACTOR SAFETY PRINCIPLES.

Place: Bhabha Atomic Research Centre (BARC), Bombay, India.

Date: 9 - 20 April 1990.

Deadline for nominations: 15 February 1990.

Organizers: The Government of India through the Bhabha Atomic Research Centre in co-operation with the International Atomic Energy Agency within the framework of the Regional Co-operative Agreement (RCA).

Language: English

Participation: The training course will be open to 12 participants from RCA Member States with operating research reactors or with ongoing research reactor projects within the Asia and Pacific region.

Participants' qualifications: Candidates should be science or engineering graduates or equivalent with some years of experience in areas like safety, design and operation and maintenance of research reactors. Persons who are likely to be involved in similar activities of large sized research reactors or nuclear power plants are also likely to benefit from the training course.

Background information: Interest in research reactors has been on the increase in the South-East Asia region. At the BARC, three research reactors, viz. Apsara, Cirus and Dhruva are in operation with excellent safety records. In order to ensure high standards of safety in research reactors, it is important that not only people from safety or regulatory organizations but also those engaged in design, construction, operation and maintenance are fully conversant with and appreciative of various aspects of reactor safety. This training course aims to systematically disseminate information about various aspects of research reactor safety, namely, objectives, principles, evaluation and practices.

Scope: The training course will consist of lectures on various facets of research reactor safety by specialists in the field. There will also be tours of research reactors and other related utilization facilities. Some special seminars on relevant topics by eminent experts are planned. Utilization of computers in some safety related evaluations is also proposed to be included.

The purpose of the training course is to present information at a level such that relatively young persons with a few years experience in areas such as research reactor safety, design, operation and maintenance are likely to benefit significantly from the course.

Course outline:

The following broad areas relevant to research reactor safety will be covered:

- Reactor safety objectives and principles.
- Organizational set-up and regulatory aspects.
- Defence in depth, accident prevention, accident mitigation and quality assurance.
- Safety principles in design and construction; engineering code and requirements.
- Core physics evaluation including safety evaluation of in-core experimental/irradiation assemblies.
- Safety considerations in commissioning and operations; technical specifications, procedures and documents.
- Radiological protection practices.
- Chemistry control for safety.
- Maintenance, testing and inspection of safety related equipments.
- Reliability and safety evaluation.
- Staff training and licensing aspects.
- Emergency preparedness and accident management.

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA application forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the National Atomic Energy Authority or the office of the United Nations Development Programme); they must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria by 15 February 1990. Nominations received after that date or applications sent direct by individuals or by private institutions cannot be considered.

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

Mr. S.N. Sengupta
Course Director
Training Course (RCA) on
Research Reactor Safety Principles
DHRUVA, BARC
Trombay, Bombay 400 085
INDIA

Telex: 117 1017 BARC IN

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

Language certificate:

In the case of countries in which English is not an official or customary language, nominations must be accompanied by a separate certificate of the candidate's proficiency in English. This certificate must be issued by a language school, cultural institution or an embassy of a country in which the language of the 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 procedure to be followed with regard to administrative and financial matters.

The Government of India will, out of its contribution to RCA, defray the cost of the participants' round trip air travel from their home countries to Bombay and back, as well as a stipend sufficient to cover the cost 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 would be well advised to take out insurance against these risks.

Prospectus

Title:	REGIONAL (RCA) TRAINING COURSE ON NUCLEAR POWER PROJECT PLANNING AND IMPLEMENTATION
Place:	Nuclear Training Centre, Korea Advanced Energy Research Institute (KAERI), Daejon, Republic of Korea
Date:	23 October - 10 November 1989
Deadline for nominations:	31 July 1989
Organizers:	The Government of the Republic of Korea, through KAERI in co-operation with the International Atomic Energy Agency, within the framework of the Regional Cooperative Agreement (RCA).
Language:	English
Participation:	The course will be open to 20 participants from IAEA Member States in the Asia and Pacific region as well as in other regions which have their own nuclear power programme or will have in the near future.
Participants' qualifications:	Candidates should be senior management professionals who work for Governmental authority or utility responsible for nuclear energy matters and national industry, likely to participate in a nuclear power project, and who will be involved in the planning and implementation of a nuclear power project. They should have a university education in science, engineering, economics or management and 3 - 5 years of relevant experience. Prior basic knowledge of nuclear technology and engineering would be helpful.
Purpose of the course:	The purpose of the course is to provide participants with an overview of practical elements involved in planning and implementation of a nuclear power project with emphasis on nuclear power project management from pre-project activities to plant operation.
Nature of the course:	The course will comprise lectures, panel discussions, small group workshops, and demonstrations of full scale nuclear and compact nuclear simulators. A scientific visit to a nuclear power plant will also be included.
Outline of the course:	The following areas will be covered:

- overview of a nuclear power project
- feasibility study
- siting and environmental survey
- public acceptance
- manpower requirements
- bid preparations
- evaluation of bidding documents

- contract
- technology transfer
- design and engineering
- quality assurance/quality control
- safety analysis, licensing and regulation
- construction and its management
- commissioning, operation and maintenance
- management and disposal of radioactive waste
- international agreement and framework
- demonstration on a compact nuclear simulator
- scientific visit (NPP site).

Application procedure:

Nominations should be submitted in duplicate on the standard IAEA application forms for training courses. Completed forms should be endorsed by and returned through the official channels established (the Ministry of Foreign Affairs, the national Atomic Energy Authority, or the office of the United Nations Development Programme). They must be received by the International Atomic Energy Agency, P.O. Box 100, A-1400 Vienna, Austria, not later than 31 July 1989. Nominations received after that date or applications sent direct by individuals, or by private institutions cannot be considered.

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

Language certificate:

In the cases 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 procedure to be followed with regard to administrative and financial arrangements.

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

The organizers of the course do not accept liability for the payment of any costs or compensation that may arise from damage to or loss of personal property, or from illness, injury, disability or death of a participant while he/she is travelling to and from or attending the 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.

ENERGY AND NUCLEAR POWER PLANNING

Project Officer: K.F. Schenk

Participating Member States:

Australia, Bangladesh, China, India, Indonesia, Republic of Korea, Japan, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, Viet Nam.

Project Objectives:

To foster regional co-operation and exchange of information in energy and nuclear power planning and, in particular, to promote exchange of information and experience and to stimulate collaboration among RCA countries in the use of the IAEA's WASP/MAED models as sound methodologies for energy and electricity planning, including nuclear power planning.

Major Activities 1989

i) Regional (RCA) Training Course on Electric Systems Expansion Planning (WASP) Asian and Pacific Development Centre, Kuala Lumpur, Malaysia, 15 May - 23 June 1989. (summary attached).

ii) Third Regional (RCA) Workshop on Energy, Electricity and Nuclear Power Planning Beijing 4-8 September 1989.

iii) Regional RCA Training Course on Nuclear Power Project Planning and Implementation KAERI, Daejon 23 October - 10 November 1989 (Republic of Korea funded) (prospectus attached).

Proposed activities 1990

Fourth Regional (RCA) Workshop on Energy, Electricity and Nuclear Power Planning 27-31 August, Republic of Korea

SUBJECT: Report on the Regional (RCA) Training Course on Electric System Expansion Planning (WASP), Asian and Pacific Development Centre, Kuala Lumpur, Malaysia, 15 May - 23 June 1989

SUMMARY

This Regional Training Course was conducted within the framework of the IAEA Regional Co-operative Agreement in Asia and the Pacific Region (RCA) and it was the first regional training course carried out under a project on Energy and Nuclear Power Planning which was initiated in 1986. The course was held at the Asian and Pacific Development Centre (APDC) in Kuala Lumpur, Malaysia, during 15 May-23 June 1989, and was attended by 31 participants from nine RCA Countries and the Solomon Islands whose participation was suggested by the Asian Development Bank (ADB). The training course was hosted by the Government of Malaysia, co-hosted by the APDC and co-sponsored financially by the ADB. Support was also obtained from the World Bank and ESCAP.

RCA activities in the field of Energy and Nuclear Power Planning arose out of an initiative from Member States. It was felt that a regional approach to the transfer of technologies associated with long term energy planning would be particularly effective for a number of reasons. Firstly, some developing countries in the region were rather experienced in the use of IAEA planning methodologies and software and other were less so. Regional Workshops and Training Courses therefore provide a natural vehicle for transfer of this technology among developing countries. Secondly, there were considerable advantages in discussing and comparing the performance of the computer programs as well as input data requirements from different countries.

The main objective of the regional course was to provide an overview of energy planning and to describe the basic principles of electric system expansion planning with emphasis on the linkages between energy planning, including electricity planning, with other sectors of the economy. In particular, the participants were trained in the use of the IAEA's electric system expansion planning methodology and computer program WASP-III in its PC version. The ELECTRIC module of ENPEP (Energy and Power Evaluation Program), developed by the Argonne National Laboratory for the US Department of Energy and made available to the IAEA for release to Member States, was used in the training course.

In order to carry out real case studies by means of the WASP-III model and based on actual data applicable to their own countries, the IAEA selected teams of two or three participants coming from the following countries (refer to ANNEX I):

1. Bangladesh (team of three)
2. China (team of two)
3. Indonesia (team of three)
4. Malaysia (two teams of three each)
5. Pakistan (team of three including one participant from USAID)
6. Philippines (two teams of two each)
7. Solomon Islands (team of two)
8. Sri Lanka (team of two)
9. Thailand (team of two)
10. Vietnam (team of three)

The corresponding teams and assignment of the PC-computer terminals are given in ANNEX II.

The programme of the training course was organized into the following six modules:

1. Overview of energy and electricity planning.
2. Energy and electricity demand forecasting
3. Electric system expansion planning
4. Introduction to ENPEP and to PC-WASP.
5. Country Case Studies
6. Preparation of country reports and presentation of reports.

ANNEX III shows the course schedule of lectures. In the first week emphasis was given to providing the basic concepts of engineering economics, an overview of energy planning, the basic principles of electric system planning and electric demand forecasting, environmental issues in electric system planning as well as an introduction to ENPEP and to PC-WASP. In the next two weeks the different WASP modules were taken up. Lectures concentrated on screening curves for comparing generation options, probabilistic simulation, fixed expansion philosophy in WASP, the preparation of the fixed expansion results and presentation of these results. This was the first milestone that participants had to reach and it was an essential part of the course. The last three weeks concentrated on the WASP variable expansion and sensitivity analysis, the refinement of the data and in lectures on unserved energy considerations, selection of discount rates, planning under uncertainty, use of WASP in LRMC evaluation. These lectures were interspersed during the day in order to break the monotony of the work sessions since some PC runs took over 8 hours. Participants started to prepare their final country case studies and final report in the fourth week and the final presentation was made on the last week. Each team was given one hour to present the results and to answer questions from the floor. At the end of the course special emphasis was given to the course evaluation by the participants (refer to ANNEX IV for sample of course evaluation questionnaire). An important aspect stressed during the course was that all models are only tools which can be very useful in planning studies but which cannot substitute for rational thinking. The course was closed on June 23rd. with a presentation of diplomas to the participants (a sample in shown in ANNEX V).

Lecturers for the course came not only from the region, but also from the Asian Development Bank, ESCAP, the IAEA, the World Bank, Chile and Brazil as shown in ANNEX VI. In total there were 20 lecturers, including 12 experts supported by the IAEA/ADB, one cost free expert from the Republic of Korea, one cost free expert from ESCAP, one cost free expert from ADB, two cost free experts from the World Bank, and three IAEA staff. All lecturers had also the responsibility to provide guidance and assistance to the participants during the execution of the country case studies.

The textbook for the regional training course was the publication: 'Expansion Planning for Electric Generating Systems, A Guidebook', IAEA TRS 241which was distributed to all the participants. In addition, all participants were given the WASP-III User's Guide, the User's Guide for the EXECUTIVE, PLANTDATA and ELECTRIC modules of ENPEP (WASP-III is ELECTRIC in ENPEP) and the following IAEA technical documents: IAEA-TECDOC-474: 'Experience with WASP among IAEA Member States participating in the Regional Co-operative Agreement (RCA) in Asia and the Pacific Region'; IAEA-TECDOC-433: 'Improvements to the IAEA's WASP-III'; IAEA-TECDOC 364: 'Experience with the Agency's WASP for Nuclear Power Planning in Developing Countries'; and IAEA-TECDOC-470: 'Electricity and Energy Demand Forecasting for Nuclear Power Planning'.

Additional Comments:

- The participants of this course, most of them engineers (electrical or mechanical) from Energy Ministries, Electric Utilities, Prime Minister's Department, and Atomic Energy Institutes, were very much impressed by the way the course was conducted without any pro nuclear bias and with impartial and fair judgement regarding alternative sources for electricity generation.

Annex 33

29321

AUSTRALIAN COUNTRY STATEMENT
12TH RCA WORKING GROUP MEETING
CHIANG MAI, 19-22 MARCH 1990

Australia notes with pleasure the progress made by the RCA during the past year. We consider that the value of the RCA as a means of nuclear technical cooperation in the Asia and Pacific Region continues to be illustrated by the range of worthwhile projects undertaken within its framework. The four major fields of activities, i.e.

- medical and biological applications of nuclear techniques
- food and agriculture
- nuclear science and energy based projects, and
- the UNDP Regional Industrial Project

are meeting the main current needs of member countries.

Australia has been pleased to maintain its involvement in and support of RCA/UNDP activities over the past year, as outlined below.

UNDP Regional Industrial Project

Australia was happy to participate in the recent consultants meeting held in Jakarta as part of the mid-term evaluation of the Regional Industrial Project. We feel that such exercises are worthwhile both to assess project implementation and to consider possible future activities. Australia has maintained its interests in the four UNDP project areas as follows:

(a) Tracer Technology

The sub-project funded by Australia in this area is proceeding satisfactorily. Three scientists from the Republic of Korea, Pakistan and Thailand were trained at ANSTO for six months, during which time they were involved in a wide range of field studies. The high standard of the trainees points to a successful transfer of this technology to industry in each of their countries.

A National Executive Management Seminar was held in Jakarta, and expert missions were undertaken to the Philippines, Thailand and Pakistan. At the request of Indonesia and Thailand, other missions were rescheduled for the first half of 1990.

One problem being encountered is a low implementation rate for expert missions - 39 per cent. A number of these are planned for 1990 and we consider it most important that these proceed according to schedule to ensure that the national tracer groups being established through this sub-project receive timely support. Also, equipment purchase is slow, however ANSTO equipment is being used so that demonstrations have not been delayed.

ANSTO now looks forward to training a specialist from China for six months in 1990.

(b) Non-destructive Testing (NDT)

An Australian NDT expert continued to assist the Regional Industrial Project.

(c) Radiation Technology

Arrangements are being finalised between ANSTO, the University of New South Wales and a private company to hold a training course on radiation curing in Sydney in late February 1991. The course is designed to take advantage of Australian expertise developed from the interaction of government, university and private industry R&D and will follow on from the attachment of three regional IAEA fellows to Sydney laboratories in 1989.

(d) Nucleonic Control Systems

Australia was pleased to be represented at the ceremony held at Mae Moh in November to inaugurate the sub-project it is funding in the use of nucleonic control systems in the coal industry. The 1989 series of courses under this sub-project was successfully conducted in November and December. These courses are designed to increase awareness in the region of the use of nucleonic control systems in the coal processing industry and to train participants in the principles of design and operation of such gauges, under the direction of the Julius Kruttschnitt Mineral Research Centre (JKMRC).

Some problems arose:

. the late ordering and subsequent late installation and commissioning of the equipment

  - this problem will obviously not affect future courses.

. optimising participation and relevance

  - to ensure that these courses reach the most appropriate personnel and have maximum relevance to them and their organisations, JKMRC experts will streamline the selection process

- they will also place greater stress on blending applications, increased use of case studies and consideration of applicants from universities and technical colleges.

The competent and professional support by EGAT and OAEP is acknowledged and the JKMRC look forward to the continuation of the courses.

Medical and Biological Applications of Nuclear Techniques

Australian interest in this area of the RCA centres on two projects: the Use of Computers in Technetium-99m Imaging and the Development of Radiation Protection Infrastructure.

• Our objective in funding a sub-project in the Use of Computers in Technetium-99m Imaging is to provide training in nuclear medicine computing to persons with previous knowledge of the subject in order to increase their level of knowledge and experience so that they can actively participate in local training programs. The first training course held in April/May 1989 under the direction of the Royal Prince Alfred Hospital (RPAH) was highly successful. It attracted thirteen participants from eleven RCA countries who attended lectures and practical sessions and were then attached to hospitals in the Sydney region.

In November three follow-up expert missions were undertaken to nine participating countries to assess course effectiveness, identify changes to the second course, offer advice on suitable candidates for that course and advise generally on computer-related problems. The missions were particularly useful in identifying certain problems with computers in the region, in identifying the most suitable candidates for the second course and, most importantly, in monitoring a communication link between participants and the relevant hospitals in Sydney.

We now look forward to the successful completion of the second training course being held from February to April 1990.

Australia has maintained awareness of developments in the major project on Strengthening Radiation Protection Infrastructure. All RCA members use ionising radiation and radioactive materials in various applications and these require proper radiation protection measures to ensure their safe use. This important project aims to assist in strengthening radiation protection capabilities in the region with particular emphasis on establishing and developing the necessary infrastructure. To further these objectives, we are considering running a second training course at ANSTO in September this year. The course would be designed to take advantage of the Fifteenth Annual Conference of the Australian Radiation Protection Society to be held jointly with the Australasian College of Physical Scientists and Engineers in

Medicine. Attendance by participants at the conference would enhance the knowledge gained from the course by exposing them to the state-of-the-art as understood by two of Australia's leading professional groups in the field. The proposal to fund the course is currently being considered by the Australian International Development Assistance Bureau (AIDAB).

Australian researchers were also involved in two coordinated research programs in the Medical and Biological Applications of Nuclear Techniques:

- Nuclear Techniques for Toxic Elements in Foodstuffs

  - participation here has demonstrated the use of nuclear techniques and multi-instrumental analyses in monitoring toxic/essential trace elements in foodstuffs. Most of the data generated in this research program has not been available previously to health authorities in Australia and will prove invaluable to their future programs. Australian specialists have benefitted from their interaction with regional researchers in areas of common interest.

- Development of Tc-99 Generators using Low Power Research Reactors

- we believe that research into novel technetium-99 generators has clearly shown that techniques resulting in a useful alternative to the more conventional generator types can be developed despite the low specific activity molybdenum-99 produced in low flux research reactors.

Agricultural Projects

The final research coordination meeting of Phase II of the Coordinated Research Project on the Use of Nuclear Techniques to Improve Domestic Buffalo Production in Asia was held at the Tropical Cattle Research Centre in Rockhampton, Australia, in February 1989 in conjunction with a meeting on buffaloes sponsored by the Australian Council for International Agricultural Research. This gathering attracted seventeen participants from eight RCA countries. The five-year program in Phase II contributed to a marked improvement in knowledge of buffalo reproduction. Participants made a series of recommendations for further work concentrated on aspects of nutrition, reproduction and diseases.

Research Reactor and Energy Based Projects

Australia is maintaining awareness of the new project on Research Reactor Utilisation. In line with recommendations from the Project Formulation Meeting, ANSTO is making a contribution to this project by running for the IAEA the Interregional Training Course on Research Reactor Core Conversion to Low Enriched Uranium Fuels in February/March 1990.

Australia looks forward to continued participation in RCA/UNDP activities, and will now being to consider possible involvement in their next phases.

Country Statement of the People' Republic of China
12th Working Group Meeting of RCA Member States
Chiangmai, Thailand 19-22 March 1990

Mr. Chairman, distinguished delegates,

The Chinese delegation wishes to express our gratitude to the Government of Thailand for hosting this important meeting with excellent arrangements and wishes to join other delegates to congratulate the success of the meeting.

RCA has set a good example for the regional cooperation and has been playing an important role in promotion of the peaceful use of nuclear energy in the Asia-Pacific region. China, as a country in this region, has actively associated itself with RCA activities and benefited from them greatly since its participation in 1985. Meanwhile, China has also made financial and technical contributions to RCA programme to the best of its ability .

Mr. Chairman, We are very happy to see the continuous progress and expansion in the RCA activities since the last meeting in Sydney. Five new projects, and one Regional Asia preject started in 1989. In particular, the Chinese delegation noted with satisfaction that the cooperation between RCA member states has recently been expanded to research reactor and energy electricity and nuclear power planning.

Now, I would like to extend a breif report on some highlights in 1989 and the scheduled activities in 1990 in China under RCA framework.

I. Industrial Applications of Isotopes and Radiation Technology

1. Tracer Application in Industry

Tracer application in Chinese petroleum industry has had some progress, The determination of water intake profile of injector with radiotracer has further extended. In 1989, about 6000 well-time have been determined, using Ba-131 microsphere as tracer. Interwell fluid tracing with radiotracer has started.

In metallurgical industry, tracer technology has been applied in the study of hot corrosion behavior of some alloys and rare earth content and distribution in iron, steel and aluminum to improve product quality and to develop new products and tracing the erosion of blast furnace.

In hydrology and water conservancy, studies have been done on the investigation of seepage in dams, of the sediment transport at the estuary of the Yangtze River and other rivers and ports.

Some other applications of tracer technology, such as Kryptonation technique and location of leaks in buried pipes and cables, were also carried out in China.

2. Non-Destructive Testing (NDT)

NDT has become a very basic and effective means of quality control in industry in China. More than 50000 persons are involved in domestic NDT practice. Now, in principle, we are self-sufficient in NDT training. But we are lack of experience in in-service inspection of nuclear power plants. As the nuclear power development programme is being implemented in China, we will strengthen the training activities in this field.

From 4-8 December 1989, a National Executive Management Seminar(NEMS) on NDT Techniques on Nuclear Installations was held at the NDT Centre for Nuclear Industry in Shanghai. One RCA expert attended the Seminar, Pre-service inspection and in-service inspection (PSI/ISI) of nuclear installations was discussed in detail.

Last year, China participated several Regional Training Courses and Workshops on UT, RT, Neutron Radiography, non-metallic, and Test Pieces. This year, we will participate related RTC and Workshops on SM, RT, UT, ET, NRT, Test Piece and others.

In 1990, the 6th National Coordinator's Meeting on NDT subproject will be held in Shanghai, China from 9-12 April, The NDT Centre for Nuclear Industry will host this meeting.

In September 1990, a National Symposium on NDT new techniques will be held in Shanghai.

Now in China there are a number of experienced NDT experts on RT, UT and other techniques, We are willing to provide our expertise for RCA member states and Asia Pacific Region.

3. Radiation Technology

Radiation Vulcanization of Natural Rubber Latex (RVNRL)

After the first and second meeting of NRG leaders on RVNRL in Kunming, China 1988 and Takasaki, Japan in 1989, We organized a National Research Group Meeting on RVNRL in Zhuzhou Institute of Rubber Latex, Hunan Provice, from 28-30 november 1989. 17 participants from 13 domestic institutions attended this meeting and a national coordinated network and R&D programme on RVNRL was set up.

Radiation Crosslinking

The Regional Training Course on Formulation Technology for Radiation Crosslinking Applications was held in Shanghai, 18-29 September 1989. This is the fourth of a series of RTC on Crosslinking, and also the first RCA activity funded by China's extra-budgetary contribution to RCA. Four foreign and four Chinese experts gave lectures on radiation crosslinking chemistry, formulation technology(in Japan, South Korea and China), EB processing economy, PV and PVC formulations for Radiation Crosslinking. Ten foreign participants and four Chinese attended the course. Visit to Shanghai Cable Works and Changshu Irradiation Center was arranged. This course successfully exchanged and tranferred the knowledge of formulation technology to the participants.

From 23 July--3 Aug. 1990, the Regional Training Course on Radiation Crosslinking technology using Co-60 will be held with China's funds in Changchun, Jilin province, China. The Changchun Institute of Applied Chemistry will be the host institution. In this course, the crosslinking chemistry, formulation technology, Gamma facility, EB and Gamma Technology comparison, benefit analysis and many others will be discussed.

In recent years, the Radiation Crosslinking technology has been successfully used to heat shrinkable materials, wires and cables, and got more economic benefits. In order to meet urgent needs from the Chinese industrial circle in this field, we will hold the NTC and NEMS on Radiation Crosslinking Technology in Shanghai University of Science and Technology (SUST), from 8-18 Oct. 1990.

Radiation Curing

In this field, China has already done much work, both in EB curing and Ultraviolet curing, but commercialization of the technology is yet to be achieved. This year, We will actively participate in the Jakarta Workshop and Training Course on Radiation Curing.

Radiation Sterilization of Medical Products

From 6-15 November 1989, a National Training Course on Radiation Sterilization was held at Beijing Radiation Centre in Beijing. More than thirty participants attended. Two lecturers from U. K. gave lectures on GMP, GRP, microbiology and sterilization technology. In April 1989, a new institution, the Beijing Radiation Application Centre was put into operation. The Centre owns an advanced facility imported from Switzerland, and has been identified as a national demonstration and training center specially for medical sterilization in China.

In 1990, We will arrange another NTC on Radiation Sterilization in Suzhou.

In 1990, the radiation-resistant polypropylene material formulation will be approved and put into production, which is a new progress in radiation sterilization of medical products.

Radiation Engineering

The total loading of all Co-60 Gamma facilities in China is about 4MCi and the total power of accelerators for industrial application is about 300 KW. By means of these facilities, more than ten kinds of radiation chemical products could be produced, more than twenty kinds of medical products could be sterilized, and more than ten kinds of food products could be radiation preserved.

There are 31 Co-60 Gamma facilities now in operation with a design capacity more than 100KCi each. Among them are Changshu, Nanjing and Shanghai Irradiation Centres, which represent 3 typical design types, GJR, FJX, and SH respectively. All these facilities have multipurpose, used for radiation sterilization, food preservation and radiation chemical technology.

We are prepared to organize a Regional Training Courseor Workshop in 1991 on Gamma Radiation Engineering, includingDesign, Construction, Operation and Economic Benefit Analysis ofGamma Ra diation Facilities. We hope this will be acceptable tothe IAEA a nd RCA.

Now, I would like to take this oppptunity to make an announcement that the 8th International Meeting on Radiation Processing(IMRP 8) will be held in the fall of 1992 in Beijing, China. We, as a host, welcome all the RCA member states to send delegates to Beijing.

As future projects, we suggest to introduce theapplication of radiation technology in bioengineering and biomedical field, such as radiation immobilization of bioactive materials and in environmental protection, such as the electron beam treatment of flue gas and the treatment of sewage sludge and other waste by irradiation.

4. Nuclear Control Systems (NCS)

It is reported that up to now in China more than 50 institutions including universities, institutes, factories and companies are engaged in the development and production of various kinds of RI instruments and gauges. And more than 50 varieties of products could be produced and supplied routinely.

The number of RI instruments in use, including imported ones, is about 7000. They are distributed in iron and steel, chemical, petrochemical, paper, building material, coal, cement and many other industries. Good economic benefits have been obtained from the application of RI instruments and NCS. Some kinds of instruments , for example, nucleonic weigh scales, are advanced. We would like to host some activities in application of nucleonic weigh scales.

Activities in NCS-paper industry were held in 1989 and will be held in 1990. From 30-31 January 1989, an expert mission on low cost NCS-Paper headed by Dr.Rao visited the Paper Industrial Research Institute (PIRI) in Beijing. In mid October, a NEMS on NCS-Paper was organized by the PIRI in Beijing, China. [illegible] IAEA experts including Dr. Manoon attended the seminar and g[illegible] lectures. More than 80 people from domestic institutions participated the siminar. The Janpanese made and the Chinese made (SIPAI and others) NCS-Paper Systems were studied and compared during the seminar. Another expert mission on low cost NCS-Paper and a National Training Course on NCS-Paper have been scheduled in Beijing in April and June 1990 respectively. These activities will promote the cooperation between China and other RCA member states.

A NEMS on NCS Civil Engineering will be convened in Institute of Atomic Energy (IAE), Beijing, in July, 1990. In 1989, one Chinese expert attended the NEMS on Civil Engineering in Republic of Korea and Tailand as a lecturer. We are also actively participating in the RCA training courses, workshops and seminars related to NCS application in Paper, Coal, Steel, Civil and Mineral Industries.

II. Food and Agriculture

1. Food Irradiation Preservation

Up to now, there are 8 kinds of irradiated food have been cleared in China, Potato, Garlic, Onion, Mushroom, Rice, Peanut, Sausage and Apple. Some of them have been put into marketing test and commercial demo trials. In recent 5 years, marketing test of irradiated foods in China have been done in totaling more than 20,000 tonnes, including sweet potato spirit, garlic, onion, apple, hot pepper and its products, sausage and others. We plan to contribute several marketing test reports to the Agency(including pictures and videos) for the purpose of pushing forward the commercialization of food irradiation in next few years.

From 8-12 January 1990, the RCA Workshop on Commercialiation of Food Irradiation was convened in Shanghai. 11 senior scientists and officals from other RCA countries and 3 Chinese participants and many observors attended the workshop. In this workshop, following topics were discussed, the status and prospects of commercialization of food irradiation in Asian region and the whole world, consumer acceptance, process control, regulation and code of practice, international Register of licensed food irradiators, man power training, irradiation to ensure hygenic quality of food, irradiation quarantine treatment and others. The Workshop made recommendations on how to promote the commercialization and international trade on food irradiation.

China has been actively participating in many IAEA and RCA activities on Food Irradiation. China is also actively participating in RPFI activities, and hope more participation in training activities in FIPCOS, IFFIT and CIC. Now, Shanghai Irradiation Center has been a member of international network of food irradiation training. In November 1990, a national training course on food irradiation will be convened in Nanjing, China.

2. Nuclear Agriculture

The Chinese institutions participate many coordinated research programmes. The Research Coordination Meeting on Radiation-induced F-1 Sterility in Lepidoptera for Area-Wide Control was held in Beijing from 22-26 May 1989, the host institution was the Institute for Application of Atomic Energy, Chinese Academy of Agricultural Sciences(IAAE/ CAAS). Eight Contract and Agreement holders and Agengy Experts and ,5 local observers attended this meeting.

Chinese participants attended following activities in 1989,

Research Coordination Meeting(RCM)

1. Use of induced mutations and in-vitro culture techniques for improving crop plant resistance to diseases. Feb. Bangkok.

2 Improvement of root and tuber crops in tropical countries of Asia by induced mutation. Feb. Bangkok

3. Radiotracer Studies of Fungicide Residues in Food Plants. March, Ankara.

4. Development of Controlled-Release Formulations of Pesticides utilizing nuclear techniques. Sept. Greece.

5. Radiotracer studies of behaviour of DDT in tropical environments. Nov. Vienna.

6. Mutation Breeding of oil seed crops. Nov. Bombay.

Interregional and Regional Training Courses,

1. Induction and Use of Mutations in Plant Breeding. March, Seibersdorf.

2. Use of Isotope and Radiation Techniques in Studies on Soil/ Plant Relationships. May, Seibersdorf.

3. Use of Isotopes and Radiation Techniques in Studies on Soil/ Plant Relationships with Special Emphasis on Trees. Nov. Malaysia.

Nuclear Techniques applied in Agriculture in China are some advanced. There are 29 species of plants and 325 mutant varieties by radiation mutation breeding in our country, making up over 1/3 of total plant mutant varieties in the world. These varieties have been released to production in some 9 million hectares. Extensive works on nuclear agricultural application are being done in China, such as, isotope tracer technique application, low dose stimulated yield raising, sterile insect technique radioimmunoassay applied in animal production and disease diagnosis and many others.

Regarding the Regional UNDP Project on increasing the yield and nitrogen fixation capabilities of common grain legumes, we actively support this project, and the Soybean Research Institute of Heilongjiang Academy and other institutes will participate in related activities.

We have also been involved in the Project on Control of Tropical Plant viruses in Asia and the Institute for Application of Atomic Energy/ Chinese Academy of Agricultural Sciences (IAAE/CAAS) participated in the Tsukuba Project Formulation

Meeting on this item in August last year.

III. Medical and Biological Applications

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

We participated in the first and second training courses held in Australia in 1989 and 1990 respectively.

2. Radioimmunoassay of Thyroid Related Hormones

In China, there are extensive R&D works on this item, We have capability in the regional supply of bulk reagents for the Regional External Quality Assessment Scheme(EQAS). As the next step, We support to extend this project to Hepatitis B. In August 1990, a Regional Training Course on diagnosis of viral hepatitis by RIA will be held in Shanghai Medical University.

3. Radioaerosol Inhalation Imaging for the Diagnosis of Chronic Respiratoty Diseases.

China has been doing research on V/Q to treat COPD and results have been obtained. So we were very interested in this CRP. One Chinese expert attended the RCM meeting in Souel in the last year.

4. Care and Maintenance of Nuclear Medical Instruments.

This is a very important combined CRP/TC Project for developing courtries. China also faces difficulties in care and maintenance of both domestic and imported nuclear medical instruments and is planning to establish a maintence center. China participated both the Indonesian first RCM meeting last November, and the BARC Regional Workshop January this year.

5. Radiation Sterilization Practices for Tissue Grafts in Clinical Use.

This is a joint CRP-TC Project that China has actively participated in. Two Chinese attended the RCA Workshop in Bangkok in 1989.

6. Nuclear Techniques for Toxic Elements in Foodstuffs.

We have done much work on trace element analysis related to health. In particular, a contract on Toxic elements in food stuffs was held by the Institute for Application of Atomic Energy / Chinese Academy of Agricultural Sciences. (IAAE/CAAS). 3 Chinese attended the final RCM Meeting in Jakarta last November.

7. Imaging Procedures for Diagnosis of Liver Diseases(PhaseII) and Improvement of Cancer Therapy(PhaseII).

We are very interested in these two projects, and will participate in related meetings.

8. Development of TC-99m Generators for Low Power Research Reactors.

China produces both fission Molybdenium and common type TC-99m generators. We are very interested in the development of this technique.

9. Some Chinese experts has just submitted a new project proposal on "The Application of Monoclonal Antibodies in Radioimmunoimaging." We hope to get some response from the Agency.

IV. Research Reactors and Energy Planning

In March, 1989 China sent a participant to the Project fomulation meeting on research reactor project in Kuala Lumpur. We strongly support this project and earnestly hope to strengthen the regional cooperation in this area. China now possesses six research reactors in operation and has accumulated more than 100 reactor years of operation experience. Besides, an 1MW TRIGA reactor developed by the South--West Center for Reactor Engineer-ing finished commissioning in Jan. 1990 and a 5MW Low Temperature Heating Prototype Reactor developed by the Institute of Nuclear Energy Technology in Tsing Hua University went critical on Nov. 11, 1989 and came to full power on Dec. 16 of the same year. Also in 1989, the National Nuclear Safety Administration of China promulgated safety codes and regulations on research reactors. In order to promote the cooperation among RCA member states, We will fund a regional workshop on reactor technology and utilization on Miniature Neutron Source Reactor in 1990. This kind of reactor was developed by China Institute of Atomic Energy in 1984 and another three of the same type have also been in operation in other domestic and foreign organizations.

Regarding the energy planning, the nuclear option has been drawn more attention by the government. While the construction of 300 MWe Qinshan NPP and 2×900 MWe Daya Bay NPP are going on smoothly, the 600 MWe NPP of PWR type has been specified as the main series type to be developed on our own efforts. The pre-phase work on 2×600 MWe NPP in Qinshan site has already begun. Meanwhile, introduction of large-size nuclear power plant of 1000 MWe class from foreign countries on more favourable commercial terms is also taken into consideration. In order to place long-term energy plan and nuclear power development programme on a more sound basis, a series of national seminars on nuclear power economics will be held in the years to come. In 1989, China hosted the 3rd regional workshop on energy, electricity and nuclear power planning.

We hope that regional training courses could be held to introduce to the developing member states some international agreed model on economic analysis on power plants in a complete energy cycle.

Besides, the National Nuclear Safety Administration of China owns a full-scale PWR simulator from SHERAN HARRIS NPP, USA, which has been used to train senior management personnel for Qinshan NPP and will be used to retrain operators for Qinshan and Daya Bay plants. Now the facility is open to the Agency for demonstration and training courses if our RCA member states have desire.

V. Others

A Regional Workshop on Characterization Methods for New Materials will be held in Beijing in August 1990, the Institute of Atomic Energy will be the host and some distinguished Chinese scientists will give lectures.

A Regional Training Course on the Preparation and Control of Radiopharmaceuticals will be arranged in 1990 in the Institute of Atomic Energy , Beijing.

.China actively participated the project on strengthening of Radiation Protection Infrastructure. We participated the CRP on the compilation of anatomical, physiological and metabolic characteristics of reference Asian man, sub-project on environmental and personnal dosimetry and so on. Since many Gamma and EB facilities are used in industry, agriculture and medicine in this region, manpower trainingin on safe management and control of radiation sources deserves strengthening.

In 1989, a Chinese expert in the field of radiation protection was sent to Thailand for advisory service.

A successful National Seminar on Isotope Methods in Environmental Studies, Hydrology and Geochemistry in China was convened in Beijing from 13-24 November 1989. Beijing Geology Institute of Nuclear Industry was the host Institution. Six foreign experts and two domestic experts gave advanced lectures during the Seminar.

In conclusion, we wish to reiterate our faith in RCA as a means of promoting regional cooperation in the different aspects of applications of nuclear techniques in the RCA member states and also reiterate that China will continue its technical and financial support to the RCA activities.

Lastly, I would like to join other delegates to express our thanks to the Government of Thailand Kingdom, the Thai Office of Atomic Energy for Peace (OAEP) and the Thai Colleages for hosting the 12th RCA Working Group Meeting and the hospitality extended to us . And once again, we are very grateful to the Agency for all its continuous support to RCA, through which the RCA programmehas steadily progressed and benefitted the economic development of the Asia-Pacific Region.

Thank you, Mr. Chairman.

Annex 35

WORKING GROUP MEETING OF RCA MEMBER STATES

COUNTRY STATEMENT - INDIA

Chiang Mai - Thailand, March 19 - 22, 1990

(Mr. R.G. Deshpande, Chief Executive, Board of Radiation and Isotope Technology, Department of Atomic Energy, Bombay)

Introduction

India is happy to participate in this Working Group Meeting of RCA Member States and welcomes the opportunity to hold discussions with their representatives on the present status and future directions for programmes under RCA. We are very happy that this meeting is being held in the salubrious atmosphere of Chiang Mai and this will make the meeting doubly rewarding. We are grateful to the Government of Thailand for hosting the meeting in this picturesque city. Over the years India has repeatedly expressed its firm belief in RCA as a powerful instrument for promoting regional co-operation in the applications of nuclear technology for human welfare. This meeting provides another opportunity for strengthening our efforts in achieving this objective.

The progress made during the last year in India in different areas of nuclear technology applications has been satisfactory. Unit 1 of the nuclear power station at Narora 235 MWe) attained criticality in March 1989 and was linked to the northern grid in July 1989. The second unit of the Narora Power Station is expected to be commissioned during the course of this year. The Fast Breeder Test Reactor at Kalpakkam was restarted in May 1989 and had a long run at low power. Preparations are under way for high power operation of the reactor in the near future. The projects for expanding the infrastructure for providing critical inputs such as heavy water, nuclear fuel to meet the target of 10,000 MWe of power through the nuclear route by year 2000 A.D. are being pursued vigorously. The production of radioisotopes in the 100 MW high-flux Dhruva reactor at Trombay is helping the efforts for extending the beneficial applications of radioisotope and radiation technology in industry, medicine and research. The Board of Radiation & Isotope Technology, set up last year, is now poised to launch a number of programmes for extending nuclear medicine, teletherapy applications in different parts of the country. Radiation technology is also expected to play an important role in preservation of food products in the coming years.

2. Medical & Biological Applications of Nuclear Techniques:
India foresees a major expansion of nuclear medicine facilities in the country in the next 5 years, after completion of the project being undertaken by DAE for installing nuclear medicine facilities in those parts of the country which lack such facilities at present. Development of nuclear medicine procedures and radiopharmaceuticals relevant to the health care needs of the country is also the major thrust of this programme. India has taken active part in the RCA projects concerning nuclear medicine in the past viz. nuclear medicine procedures for diagnosis of liver diseases and aerosol imaging for diagnosis of respiratory diseases. India is happy to

participate in phase II of the project on liver diseases which involves comparative studies of liver imaging with another modality viz. ultrosonic imaging technique. We are very happy to note that the BARC designed nebuliser has been found very effective in the diagnosis of respiratory diseases. It is gratifying to note that countries from other regions have evinced keen interest in its use. The work carried out in India under this project during 1989 concerned generating more experience with mucociliary tracheal transport studies in various disease conditions and the data obtained is very encouraging.

India attaches great importance to radiation protection and has built up a sound R&D base and infrastructure for radiation protection services. India hosted a workshop on environmental sampling and measurements of radioactivity for monitoring purposes during October 9 - 12, 1989 at Kalpakkam from its special contribution to RCA. 7 participants from RCA countries and 11 participants from India attended the workshop, which had an optimum mix of lectures and demonstrations. One of the recommendations of this workshop was that a regional intercomparison programme of environmental radioactivity measurements may be set up under the aegis of the IAEA with active participation, from Japan and India. The counduct of the workshop was appreciated by the participants, some of whom suggested holding similar workshops of longer duration (2 weeks) in the future. India will continue to actively participate in the projects under Radiation Protection Infrastructure and

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suggests that a training course on safety aspects of industrial applications of radioisotopes for participants from RCA countries be held in India during 1991. India is participating in the CRP on 'Compilation, of Anatomical, Physiological and Metabolic Characteristics of a Reference Man' and the relevant data on various Indian ethnic groups has been collected.

3. Nuclear Techniques in Food & Agriculture

India has active programme on the application of nuclear techniques for improvements in agriculture and for food preservation. As a result of concerted R&D, a number of improved varieties of important crops have been developed at BARC and have undergone extensive field trials. India is interested in participating in the proposed RCA Project on Control of Tropical Plant Viruses in Asia and the Pacific Region with the Help of Nuclear Techniques. In the area of food irradiation there is growing interest in the local industries in commercial application of irradiation technology for food preservation. The proposal for setting up of an irradiation facility for decontamination of spices for export is being actively pursued. Consumer acceptance studies of irradiated onions are planned to be carried out during this year in a medium sized city in co-operation with the state marketing organisation. Techno-economic evaluation of irradiation processing of various food products is also being undertaken concurrent with a comprehensive public awareness programme. India is interested in participating in the RPFI III Project on "Food Irradiation & Process Control" and will host the

...5/-

first RCM on Acceptance and Control of Food Irradiation in Asian Countries under RPF phase III at BARC during April 1990. India will participate in the UNDP funded project on Food Irradiation Process Control and Acceptance beginning in 1990, through a research agreement on pilot-scale use of irradiation to enhance hygienic quality of poultry, meat and sea foods.

4. Research Reactor & Energy Related Projects

India attaches great importance to the projects relating to utilisation of research reactors. India has always believed that experience in the operation and maintenance of research reactors is vital for successful implementation of the nuclear power programme. We believe that research reactors play a very important role in man-power training in the field of nuclear technology. Over the years, India has shared its research facilities and expertise with other RCA member states and has conducted workshops, seminars and training courses in the area of research reactor utilisation for the benefit of participants from the region. India supports the project proposed by Malaysia on Research Reactor Utilisation and hopes that this project will be implemented soon.

India conducted the following workshops under the programme "Basic Sciences using Research Reactors" in 1989-90 :

i) Environmental Sampling & Measurements of Radioactivity for Monitoring Purposes, October 9 - 12,1989 Kalpakkam, Tamilnadu.

ii) Maintenance of Nuclear Medical Instruments, January 15 - February 2, 1990 Bombay.

...6/-

The latter workshop was attended by 12 participants from RCA countries and 10 participants from India. The workshop was well received by the participants.

During 1990, India will conduct the following training courses out of India's special contribution to RCA :-

i) Regional Training Course on Research Reactor Safety Principles, BARC, Bombay April 9 -20, 1990.

ii) Regional Training Course on Isotope Techniques in Hydrology, BARC, Bombay, September 7 - October 5, 1990.

It is suggested that India's special contribution to RCA for 1991 may be utilised for organising the following programmes in India :-

a) "Regional Training Course on Safety Aspects in Industrial Application of Radiation Sources"

The two week course aims at training technical personnel in industrial organisations using radiation sources, on radiation safety aspects through a programme of lectures, demonstrations and plant visits. The course will include subjects such as radiation protection principles, radiation measurements, instrument calibration, management of radiation emergencies in industrial operations, regulatory aspects of radiation protection etc. Participants from industries using radiation sources in applications such as industrial radiography, nucleonic gauging, radiotracer applications, self-luminous dial painting, radiation processing could benefit from the course. The participants will be requested to present a status report on radiation safety in industrial operations of radiation sources in their own country.

...7/-

b) "Regional Workshop on Image Processing in NDT"

The 2 weeks workshop aims at imparting formal training in the field of image processing for materials evaluation and nondestructive testing to qualified scientists and engineers engaged in materials evaluation. The workshop will include lectures, demonstrations and plant visits. The workshop will cover subjects such as basics of image processing, image processing and analysis systems for materials science & NDT, image processing through microprocessors and super-minicomputer systems, interfacing requirements for metallographic and NDT equipment such as optical microscope, SEM, TEM, ESCA, EDAX & x-radiographic equipment, preventive (in-service) inspection etc. The faculty for the workshop will be drawn from leading research & industrial organisations in the country.

At the RCA meeting held in Sydney during March 13- 16, 1989, India had expressed interest in promoting regional co-operation in the field of information technology, through the proposed regional INIS centre. We are awaiting the developments in the field of compact optical discs for use in this programme and would take active steps in this direction thereafter.

5. Industrial Applications of Radioisotopes & Radiation

India has on-going programmes, covering all aspects of industrial application of radioisotope and radiation technology. Radiotracer techniques are routinely applied for trouble shooting and for improvement in industrial production processes and India will continue to offer assistance in the Tracer Technology sub-project.

...8/-

Radiation technology has been applied for sterilisation of medical supplies on commercial basis. During 1989-90 the radiation facility at the Shri Ram Institute of Industrial Research, Delhi was upgraded to enable sterilisation of medical products on a commercial basis. With the commissioning of this plant India has now 3 commercial radiation sterilization plants in operation in the country. Two private companies in the pharmaceutical field, are keen on installing radiation plants for medical products during the course of next 2 years. A pilot plant for radiation vulcanisation of natural latex (RVNL) is planned to be set up by the Rubber Board in association with Bhabha Atomic Research Centre. The 300 kilocurie irradiation facility installed at Baroda for hygenisation of sewage sludge has been commissioned. A private company plans to install an electron accelerator for cross linking applications in cables & wires. In the area of food irradiation, considerable interest has been shown by industry in adopting this process for commercial use and techno-economic evaluation is being carried out for various products. A demonstration plant for decontamination of spices for export is planned to be set up at Cochin as a part of the spices processing complex, in collaboration with the Spices Board. Industry has also expressed interest in adopting irradiation technology for sprout inhibition in onions and consumer acceptance studies are expected to be carried out in 1990.

A low cost nucleonic control system produced in India is being used in paper mills. India would be happy to organise a regional demonstration/workshop on low cost nucleonic control systems during 1991 under the UNDP Industrial Project.

During 1990 India will conduct a national training course in NDT and a regional training course on industrial radiation sterilisation (Q.C. & materials).

India participated in the Regional Consultants Meeting at Jakarta (January 22 -23,1990) for the mid-term evaluation of the industrial project. India will continue to be technological resource country and will participate in TCDC programmes where India's technical know-how could be used for technology transfer in the region, with funding from appropriate agencies. We feel that the future development of the industrial project should concentrate on specific industrial applications of immediate and direct relevance to the participating country and this may call for departure from modalities adopted in the present phase of the project.

In conclusion we wish to state that RCA has been very successful in establishing co-operative programmes in the applications of nuclear technology for the socio-economic benefits of the people of the region and for building up of infrastructure for carrying out nuclear energy related programmes in member states. As a founder member of RCA, India pledges its continued support to the RCA programme. I would like to thank our host country, Thailand, for the kind hospitality and the excellent arrangements made for this meeting.

COUNTRY STATEMENT OF INDONESIA
12TH WORKING GROUP MEETING OF RCA MEMBER STATES
CHIANG MAI, THAILAND 19 - 22 MARCH 1990

Mr.Chairman,

It is my great pleasure to participate in the 12th RCA Working Group Meeting here in Chiang Mai. My delegation would like first of all to extend its gratitute to the Government of Thailand for hosting this important meeting and for the excellent arrangement prepared.

May I recall that Indonesia has been associated with RCA activities since its inception in 1972 and has maintained its active contribution in almost all RCA programmes.We are convinced that much benefits have been gained from its participation.

My delegation wishes to take this opportunity to present its brief report on some highlights gained in the RCA activities executed in Indonesia.

Let me explain first the activities of the IAEA/UNDP/RCA Project on Industrial Application of Isotopes and Radiation under RAS/86/073.

An IAEA Mid-Term Evaluation Mission headed by Prof.Byong Whi Lee has visited Indonesia last January 1990 and has discussed with the National Institution. A meeting was also held with the representatives of the third party. About 25 participants from various industries, chamber of commerce, and governmental institutions represented at this meeting. We do believe that through such a direct dialog done between the members of the MEM and the users of nuclear techniques in industry, a good understanding was obtained during the discussion and various imputs and informations collected from the dialog would be valuable and of great importance for both parties. We have observed that the third party has gained a good understanding after the dialog with the MEM 's members. What, when and how to properly use of nuclear techniques to solve problems in industry is already known to them. However, more frequent demonstrations are still needed to gain better understanding to a rapid transfer of nuclear technology to the users.

A consultants' meeting was also held for the representives from the member countries of the RCA not visited by the MEM.

Tracer Technology Sub project

A NEMS was held in June 1989 at the Kujang Fertilizer Manufacture in Cikampek, West Java. The seminar was attended by 80 participants from various industries scattered in whole Java and some of them came from the northern part of Sumatra island. The IAEA has provided three experts for the seminar, two from Australia and the other one from India. Discussions with the participants were very impressive since the experts and the participants stayed at the same house.

A National Training Course on the application of tracer technique in oil distribution was especially held for the foremen of Pertamina (state owned oil company). Four times of similar course have been held and about 120 foremen have been trained.

Beside the NTC mentioned above, on requests of several industries, namely cement, aluminum, and oil some assistances have been provided by Batan to solve the problems faced.

Nucleonic Control System (NCS) Sub-project

Nucleonic control system has already been used in various industries, namely paper, steel, mineral, cigarettes. etc. Most of them are already built-in since the beginning of the order.The numbre of registered NCS in Indonesia is gradually increased from year to another year as seen in the table below.

Type of Industry	1982	1986	1989
Paper	4	7	12
Steel	2	3	3
Mineral	-	14	19
Others	5	22	34
Total	11	46	68

Non-Destructive Testing Sub-project

Indonesia has been always participating in various NDT programme of RCA, such as seminars, training courses, workshops, and other meetings held in the country as well as abroad. The important achievement reached during last year was the establishment of a National Committee on Qualification and Certification of Radiography which was issued by a decree of the Minister of Industry.

A National Training Course on Radiography and on Eddy Current was held during the last year. An expert from Malaysia was assigned to assist in the Eddy Current Training Course.
NDT has been widely used in Indonesia. Regular training for NDT personnel was held through the year.

BATAN is ready to produce Iridium source for camera of radiography in the near future. We do hope to enable assist in the replacement of source of their camera.

Radiation Technology-Sub-project

Much progress have been achieved in Radiation technology Sub-project during the last year. Indonesia has participated in this Sub-project activities since early Phase I and still actively participating up till now. Several meetings, seminars, workshops, training courses, nationally and regionally have been attended by Indonesia.

The use of RVNRL in various manufacture is recently sharply increased. There is a demand for irradiation service of about 9000 tons of natural rubber latex per annum. The source strength left recently in the latex irradiator is about 117 kCi. Much more time is needed for radiation vulcanization and it seems not more effective due to high cost of energy. Therefore we are trying to look for assistance in getting Co-60 source to optimize the efficiency of the irradiator.

A statement made by the Chairman of rubber glove association in Jakarta during the inauguration of 59 Rubber Manufactures by the President Suharto, indicated that surgery rubber gloves made of RVNRL gave better results compared to conventionally vulcanized latex, and RVNRL surgery gloves are acceptable by the importing countries like USA.

Mr Chairman,

Before I close my statement allow me to address one more point to this RCA Working Group Meeting. May I recall that

Batan's nuclear facilities at Serpong will be completed in 1991. We have recently three complexes of nuclear facilities in Jakarta, one located at Serpong about 20 km from Batan's Headquarter, the second one located at Pasar Jum'at, about 8 km from the Headquarter and the third one at the Headquarter.We have two more Research Centres, one located at Bandung, West Java and the other one at Yogyakarta, Centre Java.

Our facilities are furnished with three research reactors, a MPR-30 research reactor at Serpong, a one MW Triga Mark II at Bandung and the third one a Triga Mark II type with a 250 kW power. At this occasion we are very pleased to make an announcement that BATAN is decided to open its Research Reactors and its supporting facilities to be used for cooperative programme in the framework of RCA in the years to come.

Further arrangement will be made between the RCA and our government. As the Research Reactor Utilization is a common interest of most member countries in this region the Indonesian delegation has submitted to the RCA Representatives' Meeting held in Vienna during the General Conference of the IAEA last September 1989, a proposal to host a Three Weeks Course on Computer Application on Research Reactor Control and Calculation as stated in Annex 11 in the document Report Eighteenth General Conference Meeting of Representatives of RCA Member States.

Thank you, Mr. Chairman.

Chiang Mai, 20 March 1990.

Country Statement

March 1990
JAPAN

Japanese delegation is very happy to participate in the 12th RCA Working Group Meeting and wishes to express its deepest gratitude to the Government of Thailand for having hosted this important meeting with excellent arrangement as well as its hospitality extended to us all.

We are pleased to note the continued progress of the RCA activities through discussions during this meeting.

Considering that uses and applications of nuclear techniques are expanding in inudstrial, medical and agricultural fields in RCA countries and that this trend is expected to continue in the future in view of great advantages brought about by such applications, we recognize the importance of various peaceful applications of nuclear energy in the development of the economies and social benefits in the region. It is my conviction that we shall continue to see the spirit of co-operation and mutual understanding which distinugishes this regional co-operative undertaking as an outstanding example of nuclear co-operation. The Government of Japan will continue to support the RCA program activities technically and financially as the most important vehicle for co-operation of this kind.

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Over the past year, progress has been recorded in the projects supported by Japan. Following is the outline of the progress of the RCA project in which Japan has been participating.

UNDP Industrial Project

(1) With close co-operation among the RCA member countries, the Agency and UNDP, marked progress has been noted in the Radiation Processing, Non Destructive Testing and Nuclear Control Systems. Among these sub-projects, remarkable outcome has been achieved in Radiation Vulcanization of Natural Rubber Latex. Basic R&D developed in particular by JAERI, Takasaki has been transferred to various research groups in such member countries as Bangladesh, China, India, Indonesia, Malaysia, Sri Lanka, Thailand and Vietnam. Emphasis is now put on encouragement of R&D by those research groups and also on promotion of technical transfer to local enterprizes. This new technique for vulcanizing natural rubber latex using gamma radiation enables us to provide a high quality material for medical and surgical uses.

(2) In this connection, Japan wishes to raise a suggestion referring to the contribution of the UNDP Industrial Project in the context of the regional economic development.

Eight years have already passed since this regional co-operative project began. After tremendous efforts have been made in research and development during the past years, good results have come out in various sub-projects. However, in aspect of technological applications, it seems that those effective and useful results of R&D have hardly combined to actual technical upgrading in local industries in the member states. As Japan has emphasized several times the importance of technical transfer in the past RCA meetings, it is essential, at this program cycle, to promote the application of the technology developed under the Project for the development of local companies and factories so that the RCA co-operation can contribute directly to the regional industrial development, which is the essential purpose of the RCA. Therefore, I wishes to suggest that we sould hold a meeting discussing how to accelerate the technical transfer in each member country. Japan will be pleased to host such a meeting if the other member countries would support the idea.

(3) We received for two days last January the UNDP evaluation mission composed of Prof. Byong Whi Lee, Mr. George Wheeler and Mr. David Kay of the Agency. Active discussions were made between Japanese experts and the mission. My delegation would like to express, in this opportunity, its gratitude to the members of the mission

for their efforts dedicated to the duty. We hope that the problems pointed out in the discussions will be examined well and the results of the evaluation will be effectively reflected on planning and implementation of the future program activities.

Strengthening of Radiation Protection Infrastructure

This year falls on the third consecutive year since this project started in 1988 aiming at improving and strengthening radiation protection capabilities of the RCA member states through concerted and comprehensive program activities with emphasis placed on those leading to infrastructure building. During this period, a number of programs have been implemented by Australia, India and Japan, which would benefit to many experts in all member countries. In this year, Japan will host "the Intercomparison on Personal Dosimeter and Workshop" in October and, if the circumstances allow, an Expert Advisory Group Meeting to discuss the activities in the future. Japan will also continue to support CRP on "Compilation of Anatomical, Physiological and Metabolic Characteristics for a Reference Asian Man".

Research Reactor Utilization

A Japanese expert participated as a lecturer in the Regional Training Course for Research Operations held in Bangkok last December. Japan will continue as much as possible to support this project through its contribution in kind, for instance sending experts, accepting researchers and trainees, etc.

Food Irradiation (Phase III)

Due principally to our domestic policies towards food irradiation, Japan ceased its financial support to the project at the completion of Phase I. However, Japan has remained interested in co-operation and contribution in kind to R&D in this field, sending some experts at the request of the Agency. In this year, Japan considers holding a training course at JAERI, Takasaki in October and inviting all the member countries to participate in this course.

Finally I would like to add that Japan is nurturing an idea of proposing a new RCA project on the application of radiation technology to resolve the increasing environmental problems many countries in the region are facing today. Although we are not in a position to elaborate our contents and methods to be implemented in the project which we have already mentioned roughly on the first day of this Meeting, we would suggest the said idea in more detail after consideration in the near future..

I would like to add that we are pleased to have recieved positive responce from the other member states regarding our policies.

COUNTRY STATEMENT OF THE REPUBLIC OF KOREA
THE 12TH WORKING GROUP MEETING OF RCA MEMBER STATES
CHANG MAI, THAILAND, MARCH 19-22, 1990

March 20, 1990

Republic of Korea

COUNTRY STATEMENT OF THE REPUBLIC OF KOREA
THE 12TH WORKING GROUP MEETING OF RCA MEMBER STATES
CHANGMAI, THAILAND, MARCH 19-22, 1990

Mr. Chairman and Distinguished Delegates.

It is my great pleasure to participate in this 12th Working Group Meeting of RCA Member States.

On behalf of the Korean delegation, I would like to express my congratulations on your election as Chairman of this Meeting and our deepest gratitude to the Government of Thailand for hosting this important Meeting with such excellent arrangements, along with the warm hospitality extended to us all.

Since Korea first became a member of RCA in 1974, we have been actively involved with many RCA activities and have made financial and technical contributions to the Regional Training Course on Nuclear Power Project Planning and Implementation from 1988.

We recognize RCA as the most useful vehicle for nuclear technical cooperation in the Asia and Pacific Region, as it has played the leading role in promoting the peaceful uses of nuclear energy and isotope applications in the medical and agricultural fields as well as industry, over the past two decades.

In this connection, I would also like to thank the IAEA reprentatives concerned, RCA Coordinator and Project Coordinator for UNDP Industrial Projects for their devoted endeavors in implementing RCA programs.

Particularly, we extend our deepest appreciation to the IAEA/UNDP Evaluation Mission for establishing the future direction of UNDP projects implemented this past January. The Korean Government holds the position that the result of this Mission should reflect a common aim of increasing the use of nuclear technology in regional industries, thus furthering regional economic development and industrial competitiveness.

Nowadays, nuclear power is becoming an increasingly important contributor to the world energy supply. We will undoubtedly witness many countries expanding their nuclear power programs well into the next century, with several new developing nations introducing programs of their own. In following up the two successful training courses held under our own full financial support, we will host the 3rd Regional Training Course on Nuclear Power Projects Planning and Implementation in October of this year about 20 participants for sharing our own experiences. This Course will provide the planning and implementation methods associated with nuclear power projects, with emphasis on nuclear management from pre-project activities to full plant operation.

In addition, I wish to assure the member countries that we will continue to strengthen our efforts to take an active part in RCA projects and activities in principle. I believe that such efforts will allow us to act as a bridge between industrialized countries and developing countries in the transfer of nuclear science and technology.

Review on RCA Technical Projects

1. Regional Industrial Project

1-1 Tracer Technology

- The Korea Atomic Energy Research Institute (KAERI) carried out a project, "Measurement of Mixing Rates of Powdered Raw Materials" in collaboration with the Korea Welding Electrode Co. The mixing rates of flux raw materials for production of welding electrodes were measured using technetium-99m. Based on the results, the operation conditing of the mixers will be modified after intensive discussion with the plant operator.

- KAERI has conducted, as in the past, efficiency tests on the steam generator at the nuclear power plant using 2 Ci Na-24. The test is now routinely performed in Korea as we have carried it out 15 times since 1978.

- The KAERI tracer team is planning to have one more tracer demonstration within this year in the field of sand drift studies at a coastal site or mixing rate measurement in a certain industry under IAEA expert assistance.

- We hope for the scope of the Tracer Technology to be extended to include civil engineering and environmental engineering.

1-2 Non-Destructive Testing (NDT)

- Korea has actively took part in the NDT projects in 1989, participating in three Regional Workshops, i.e., Regional Workshop on Neutron Radiography in Japan in May, Regional Workshop on Non-Metallic NDT in Japan in September, and Regional Workshop on the Fabrication of NDT Test Pieces in Indonesia in November. In addition, Korean expert gave a lecture at the Regional Seminar on NDT in Nuclear Installation held in China in December, 1989.

- Korea will host one Regional Seminar on In-Service Inspection for Petroleum Plants and one National Seminar on NDT for Nuclear Power Plants in 1990 as scheduled.

o In our situation, the regional workshops or seminars are more helpful to us than normal NDT level II and III courses. Therefore, it is desirable for Korea to participate to the advanced course in the future. In this connection, Korea suggest that the training courses be held upon request of each member countries.

1-3 Radiation Technology

o In 1989, a KAERI radiation technology team carried out two projects: "Development of Heat Shrinkable PVC Tubes" and "Development of Radiation Resistant Medical Polypropylene". The effects of various additives and aging time were studied to determine economic formulation of additives.

o A Korean expert gave a lecture at the Regional Training Course on Formulation Technology for Radiation Closslinking Applications in China in September, 1989.

o "NTC on radiation Sterilization of Medical Products" and "NEMS on Electron Beam Technology for Treatment of Flue Gases" were held by KAERI in cooperation with UNDP/IAEA/RCA in Ocotber 1989.

o Three electron accelerators and two Co-60 Irradiation Facilities are operating in Korea for radiation modification of polymer insulation in electrical wire and cable and radiation sterilization, respectively. One more electron accelerator is planned to be constructed in the industrial sector.

1-4 Nucleonic Control System (NCS)

o In Korea, NCSs are mostly imported together with huge industrial plants, and are operated according to the instruction manual published by the manufacturer. Various NCSs for the automatic control of level, thickness, density, etc. are now in use, with the total number estimated to be some 700. Industry is interested in replacing the old radiation sources with new ones and subsequent recalibration of NCSs. The high cost of NCSs discourages its applications. Application of soil density/moisture gauges for soil compaction control purposes in Korean civil engineering is still at the beginning stage.

o A KAERI RI group produced a small amount of low level radiation sources such as Co-60 for NCS purposes in 1989. Also, they developed a replacement technique for old RI sources.

o The Korea Institute of Construction Technology hosted an NEMS on NCS civil engineering in August, 1989.

o NCS applications will be increased when a low cost NCS is available. KAERI's RI source production and replacement techniques will promote NCS application in the future. Such services should be further encouraged. It is desirable to employ a gradual approach to produce low cost NCSs in developing countries.

2. Medical and Biological Applications of Nuclear Techniques

2-1 Radioimmunoassy (RIA) of Thyriod Related Hormones

o we accept that the recommendation of the Consultants Group Meeting for implementing the programs in 29 November - 1 December 1989.

2-2 Proposed Phase II RIA for Hepatitis B Diagnosis

o Please refer to our separated Working Plan for this Project.

2-3 Imaging Procedures for Diagnosis of Liver Diseases-Phase II

o Hepatic scintigraphy is known as a very sensitive and useful tool in the early diagnosis of liver disease. However, the reading of scans is so subjective that it varies from doctor to doctor,necessitating standardization of reading.

o We expect to provide a diagnostic criteria of scan findings in liver diseases by comparing scan findings with liver sonography in patients of Japan and Catholic Medical Center. A final report will be provided as an atlas no later than September, 1991.

2-4 Improvement of Cancer Therapy - Phase II (Computer Assisted Planning and Dosimetry in Radiotherapy of Corcinoma of the Cervix in Asia Countries)

o We would be pleased to actively participate in the proposed project following the conclusion of the Project Formulation Meeting to be held in June this year.

2-5 Inhalation Imaging for Diagnosis of Respiratory Disease

o A radiaerosol ventilation lung scan has been proved to be a very useful tool for evaluation of the regional ventilation function of lungs in chronic obstructive lung disease. Our final results were already reported at the RCA meeting on September of 1989 while the atlas of ventilation scans will be published this April.

2-6 Development of Radiation Protection Infrastructure

o The work plan of Establishment of Reference Asian Man in 1990
  - The data collection and evaluation on physical standards (body weight and body length) and organ weights will be carried out for a first year. The physical standards will be determined by the direct survey on about 1,000 total the various individuals in age and sex groups. The mass of internal organs according to age and sex will be determined from the autoptic data (1982-1988) of the National Institute scientific investigation.

o Regarding the Personal and Environmental Dosimetry we will designate an appropriate expert to be incharge of the project as soon as possible.

2-7 Radiation Sterilization for Tissue Grafts

o A Korean expert participated in the Regional Workshop on Radiation and Nuclear Techniques for Sterilization and Clinical Quality Control of Tissue Grafts in Bangkok, Thailand in November 1989.
  The expert gave a presentation on "The Clinical Effects of Hyperbaric Oxygen Therapy after Bone Allograft".

o We are now considering hosting an RCA Workshop on Radiation Sterilization for Tissue Grafts within this year under the assistance of IAEA.

o Also, we are planning to establish a tissue bank with a 5-year plan for producing and supplying tissue grafts and biomaterials at the Korea Biomaterial Research Institute of Wonkwang University under the assistance of experts and equipment provided by IAEA.

2-8 Care and Maintenance of Nuclear Medical Instruments

- o We believe that instruments are of prime importance for the development of nuclear medicine. Almost every researchers desires further improvement of maintenance techniques as well as that of their usages. Through participation in this project, Korea expects technical improvement in this field.

3. Agricultural Projects

3-1 Food Irradiation Process Control and Acceptance

- o In order to increase understanding regarding irradiated foods, safety of food irradiation technology was propagated by a Korean consumer assosiation. Potential hazards of chemical fumigant treated foods were reported to the concerned health authorities and the needs of commercial preservation of irradiated dried fish were considered in cooperation with the Ministry of Agriculture Forestry and Fisheries(MAFF) and the Ministry of National Defense.

- o Not only the test marketing for irradiated dried fish be carried out in cooperation with MAFF the Ministry of Health and social affairs and the consumer association, but also an investigation on microbiological and physicochemical properties of commercially stored irradiated foods will be performed in collaboration with the local food industry.

3-2 Improvement of Grain Legume Rhizobium Symbiosis to Fix Atmosheric Nitrogen

- o Korea is interested in participating in this project by a research contract. Soybean is a major crops in Korea, as are rice, barley and wheat. KAERI and the Rural Development Administration (RDA) have bred soybean cultivars. The former has mainly been carried out the mutation breeding since the 1960's and collected about 3,500 lines of soybean germplasm. Among 1,000 lines of mutants selected from irradiated soybeans, some were released to former as leading cultivars. Bangsakong is a representative cultivar with a wide adaptability covering the entire southern part of Korea, having a productivity rate 30% higher than that of check cultivar. However as this productivity is still rather low, KAERI has undertaken a the project to improve the soybean cultivar by radiation mutation breeding.

- o RDA carried out the following subjects as one of the RDA-UNDP/IAEA Projects (ROK/84/003).
  - Selection of the DLS line of super nitrogen fixation in soybean
  - Development of superior rhizobium materials in legumes
  - Study on nitrogen fixation of leguminos rhizobium

- o The Agricultural Sciences Institute as well as other institutes of RDA conducted the following research work, abtaining numerous results
  - Development of a measuring method for the amounts of symbiotic N2-fixation with soybean modules.
  - Determining the physiological and ecological characteristics of indigenous soybean rhizobia distributed in Korea.
  - Competition activity between the number of indigenous rhizobia and actinomycetes in soybean cultivated fields.
  - Investigation on the effects of co-inoculation of Rhizobium Symbiotic nitrogen fixation with soybeans.

- o In line with the above findings, RDA requires participation in the titled subject.

- o We expect the following through RDA participation.
  - Selecting more effective Symbiotic N2-fixation Rhizobium strains in soils.
  - Isolation and identification of effective indigenous Rhizobium strains to increase N2-fixation.
  - Adopt an effective N2-fixing Rhizobium mutant strains using the gene recombination.
  - Inducing the supernodulation, and increasing the yield and quality of legume grains.

3-3 Nuclear Techniques to Improve Domestic Buffalo Production

- o RDA wishes to discuss and extend the techniques of multidisciplinary programmes such as nutrition, disease and management of buffalo production, although the Republic of Korea has no relation with the titled subject.

3-4 Integrated Control of Tropical Plant Viruses with Nuclear Techniques

- o The background of the subject
  - As rice and other upland crops in tropical areas grow the whole year round, virus diseases accumulated.
  - A study on the identification, isolation and ecological approach to virus diseases were not developed.

o The Republic of Korea has developed many techniques
- Identification of plant viruses
- Screening of resistant varieties
- Disease forecasting
- Production and supply of antiserum
- Epidemiology and control

o RDA desires implementation of this titled subject and give in '90's application for an RCA project

o RDA anticipate the following;
- Development of attenuated viruses for the control of virus diseases using radioisotopes and utilization of those developed things.
- Availability to donate the related techniques due to sharing the research work.
- Increase of agricultural production and new selection method for plant viruses by the production of virus-free plants will contribute to the establishment of virus control.

3-5 Regional Programme to strengthen Research on Animal Production and Disease Diagnosis in Asia through Application of Immunoassay Techniques. (New project proposal)

o Animal Production

- RDA will strengthen research relations with superovulated production through treatment with endogeneous hormones and thus desires to implement this subject.

)A was used for the development of rapid and sensitive diagnostic tests y the production of monoclonal antibodies against pathogens of veterinary.

o Recently, detection techniques under the test using non-isotopic in situ by hybridization method is common in RDA. In the future, immunoassay techniques will be subjected in Veterinary Research Institute by application of radio-immunodiagnosis using monoclonal antibodies.

o Also, RDA plans to contribute the related techniques and scientist exchange.

3-6 Regional Asian Project on Nitrogen Fixing Trees for Increasing Soil Fertility, Crop and Fuel Wood Production.
(new project proposal)

o Korea has great interest in this project. The Foresty Research Institute is related with this in the Republic of Korea.

3-7 Application of RFLP Technology in Fundamental Genetics and Breeding Programs in Crops (New Project Proposal by Republic of Korea)

o One of the first techniques of biotechnology to be incorporated into existing breeding may be epoch-making in agricultural production in the Asia Regions.

o Agricultural Sciences Institute of RDA in continuing to develop the high density RFLP map. Also, rice gene characters will be analyzed.

o In line with this subject, it is possible to increase breeding selections to clone genes, such as genes for disease resistance or stress tolerance

o RDA desires to gradually cooperate in research work with institution in the Asia Region.

3-8 The Use of Nuclear Techniques to Improve Forest Tree Species
(New Project Proposal by ROK)

o Please refer to Separated our New Project Proposal.

4. Research Reactor and Energy Based Projects

4-1 Research Reactor Utilization

0 For the case of the Republic of Korea, two aged TRIGA reactors are in operation and one multi-purpose research reactor (KMRR) is under construction. Their safe and effective operation and utilization are closely related to the success of domestic nuclear power projects as well as to the justification of research reactor operation.

- o Establishing effective and accurate experimental procedures for the rigorous verification of KMRR design, is needed before its commissioning, since it is the first research reactor domestic designed and its operations and management will be heavily dependent on computing simulation without a mock-up.

- o We expect that this project will help the success of our research reactor program and we will share those results of our program with member states.

4-2 Regional Training Course on Nuclear Power Project Planning and Implementation.

- o As we are aware, Nuclear Power is becoming an important contributor to the world energy supply. The Republic of Korea stress that nuclear benefits should be fully available for mutual benefit. In this context, we organized this training course to share with other developing countries our own experiences and technologies in nuclear power accumulated over the past quarter of a century.

- o The course will be open to about 20 participants from among RCA member states in the Asia and Pacific Region as well as and from other IAEA Member States which have their own nuclear power programs or will have in the near future.

- o In regard to the training course we wish for the Agency to provides us with appropriate foreign experts for lectures on the following areas with the Agency's financial support:

  - Status and trends of nuclear power in the world;
  - Manpower requirements:
  - NPP acquisition, turnkey and split package approach;
  - Bid preparations;
  - Financial and legal bid specifications;
  - Technical bid evaluation;
  - Economic evaluation of bids;
  - Contract terms and conditions;
  - Negotiations and contracting;
  - Selection of suppliers;
  - Local participation and technology transfer;
  - International agreements and their framework;
  - Others as necessary.

4-3 Energy and Nuclear Power Planning

o KAERI plans to host within the fourth RCA Workshop on Energy, Electricty and Nuclear Power Planning in cooperation with Korea Electric Power Corporation and Korea Energy Economics Institute under IAEA financial supports.

5. Others

5-1 Marine Contamination and Sediment Transport

o An expert visit was made on 3-5 March 1990 by Prof. Roy Carpenter of the University of Washington, U.S.A to review the current status of Korea regarding IAEA project on "Marine Contaminant and Sediment Transport". The followings are the ideas and suggestions arisen during his visit.

- Korea fully recognizes the importance of the project since we are facing a number of problems in Korean waters such as sediment contamination with toxic heavy metal and organics, an altering sediment transport pattern due to reclamation, and mud belt formation in the southwestern sea.

- Since IAEA stresses development of necessary skills to solve the problems facing individual countries, Korea would like to propose the following area : Training on the measurements of uranium and thorium isotopes in the sediments and intercalibration of sediment radionuclide measurements. As the Korea Ocean Research & Development Institute is well equipped with personnel and equipment to study the marine contaminant and sediment transport in the coastal area, Korea can host a training program of this project in 1991 or 1992, with substantial support from IAEA. A longer term aim of this program is to develop and strengthen regional cooperation among RCA mumber countries

5-2 Regional Footnote-A Projects

o With reference to the letter of Mr. P. Airey dated 19 February 1990 concerning the Extra-budgetary contribution to the following Regional Footnote-A Projects, it is considerable within our extra budgetary fund.

- Use of Computers in Technetium-99m Imaging
- Isotope Hydrology and Sedimentology
- Control of Tropical Plant Viruses

6. New Project Propropsals

o Due to short notice and lack of information, we could not review following project proposals ;
  - Nuclear Instrumentation
  - Risk Management and Comparison in Large Industrial Areas
  - Control of the Diamondback Moth in South-East Asia Using F-1 Sterility

o We will advise you of our position on this matter after examination by the relevant institutes.

COUNTRY STATEMENT - MALAYSIA
TWELFTH WORKING GROUP MEETING OF RCA MEMBER STATES
CHIANG MAI, THAILAND, 19-22 MARCH 1990

Introduction

The Nuclear Energy Unit in the Prime Minister's Department undertakes programmes that encourage industrial involvement particularly in the utilization of radioisotopes and radiation technology. The Cobalt-60 radiation facility has been upgraded to 337 kCi from the initial 200 kCi to significantly enhance research capabilities particularly in the area of radiation processing and medical products sterilization. The installation of an electron beam machine (EBM) later this year will add to the already available facilities mentioned earlier.

The role played by the RCA is paramount to boost the utilization of radioisotopes and radiation technology in Malaysia. Malaysia continues to support and actively participates in all RCA/UNDP programmes.

Activities carried out during 1989-1990 are summarised below.

I RCA Programme on Industrial Application of Isotopes and Radiation Technology.

1. Tracer Technology.

Malaysia has turned out a core of nuclear scientists who are familiar with the general requirements pertaining to tracer/sealed source of radioisotopes investigation as well as for planning and executing tracer/sealed source studies.

Malaysia also hosted the Fourth Regional Training Demonstration on the Use of Tracer Technology in Industry from 9 to 27 October 1989. Efforts are being made to further promote the applications of the technique in industry since the response has been positive. Due to the keenness shown on the part of the industry prompted the Unit to embark a promotional programme that emphasises on-site demonstration.

2. Non Destructive Testing

This project which received full support from the RCA/UNDP/IAEA played a major role in upgrading the quality of NDT in the country. Under the auspices of the National Qualification and Certification Scheme (NQCS), four National Trade Standards for NDT personnel have been approved and implemented, the last being the standard for liquid Penetrant Tester; approved in 1989. Another Standard for Eddy Current Tester which is mainly used in the aviation industry and already bound by the International Regulation will be realised in 1991.

Since the Implementation of the NQCS, a total of 24 training courses have been conducted in accordance with the National Trade Standard which is supported by the IAEA/RCA/UNDP in the form of experts/lecturers.

A total of 411 participants from a broad spectrum of NDT activities have qualified and have been certified. Qualified personnel have been and will be accepted by the local industries. Those accepted have performed with a reasonably high level of competency.

The size of current NDT activities and the expected demand in the future prompts the government to establish a National NDT Centre of Excellence. The Centre is to be fully operational by the end of the Sixth Malaysia Plan (1991-1996). This will ensure the improvement, control and monitoring of the quality of local industrial products.

Two courses will be held this year at the Nuclear Energy Unit.

3. **Radiation Technology**

Research in the area of radiation vulcanization of natural rubber latex is being actively undertaken. A national research group comprising of researchers from the Rubber Research Institute of Malaysia (RRIM), the National University of Malaysia (UKM) and the Nuclear Energy Unit (NEU) has been formed. Initiatives to formulate regional cooperation on the subject will be an added advantage.

A seminar on Radiation Processing of Polymers was organised by the Nuclear Energy Unit (NEU) last year. The National Workshop on RVNRL will be held this year together with the Regional Workshop on Regulation in Industrial Sterilization to be held in Malaysia from 28 May - 1 June 1990.

4. **Nucleonic Control System In Industry**

The application of Nucleonic Control System in Industry is still in its early stage. However, through the promotional programme conducted at the Nuclear Energy Unit in cooperation with the IAEA under the RCA/UNDP Industrial Application project and to some extend due to the economic recovery, the number of NCS and nucleonic instruments being applied in the country has increased. Five nucleonic control systems have been implemented in the paper and pulp industry. Six more systems, one of which is a density gauge, were also implemented in the mineral industry. Nuclear gauges for measuring density and moisture content of soil and soil aggregate have been used in government and in the private civil engineering sectors.

II The RCA Programme on Medical Applications of Nuclear Techniques

1. Care and Maintenance of Nuclear Medicine Instrument

The care and maintenance of nuclear medicine instrument is an important component in the development of nuclear technology in Malaysia.

As a start, a survey is being carried out to determine the number of nuclear medicine instruments already available in the hospitals and universities in Malaysia. The Nuclear Energy Unit is going to organise a training course with regard to nuclear medicine equipment designed for laboratory staff and instrument users. Early this year, an officer from the Nuclear Energy Unit participated in the Regional (RCA) Workshop on the Maintenance of Nuclear Medical Instruments in India.

2. Nuclear Techniques for Toxic Elements in Foodstuffs

Malaysia participates in the project on the application of nuclear techniques for toxic elements in foodstuffs which began in 1986. It is now in its final stage of collection of data for toxic elements content in common local Malaysian foodstuffs. The Agency has agreed to renew the research contract for another year.

III. RCA Programme on Research Reactor and Energy Based Projects

Research Reactor Utilization.

Malaysia proposed the Regional (RCA) Cooperative Project on Research Reactor Utilization and hosted the Project Formulation Meeting in March 1989. The project will promote collaboration among member states in the areas of research reactor operation and maintenance, management and developmental research towards optimising its potential as well as optimizing its utilization. The Coordinated Research Programme on the Applications of Personal Computers to Enhance Operations and Management of Research Reactors is the result. The Second Asian Symposium on Research Reactors (ASRR-2) was successfully organised by BATAN and the IAEA in Jakarta in May 1989.

New Project Proposals

RCA Project on the Control of Tropical Plant Viruses in the Asia and Pacific Region using nuclear techniques.

Malaysia supports this RCA project.

Other Activities

A regional project on Marine Contaminant and Sediment Transport was proposed. Consequently an IAEA expert, Prof. R. Carpenter visited Malaysia to look into the feasibility of implementing the project.

A Regional Training Course on Soil-Plant Relationships with special emphasis on Trees was held at the Nuclear Energy Unit from 6 November to 8 December 1989, while a Research Coordination Meeting on the Use of Irradiation as Quarantine Treatment of Food and Agricultural Products, will be held in August 1990. On the medical related topic, a Research Coordination Meeting on Optimization of Nuclear Technique for the Survey of Thyroid Function of Newborns in Endemic Goiter Areas will be held from 23-25 April 1990.

Annex 40

COUNTRY STATEMENT - PAKISTAN
FOR
12TH RCA WORKING GROUP MEETING,
CHIANG MAI, THAILAND,
MARCH 19 - 22, 1990.

Pakistan has been associated with the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) from its beginning. RCA has completed 17 years of its successful existance during which it has achieved tangible and remarkable progress in the field of peaceful uses of atomic energy in industry, agriculture, biology and medicine.

Pakistan is actively participating in almost all of its activities and has benefited from them either by way of training, participation in Working Group Meetings, workshops, seminars, or by undertaking a number of research contracts with the IAEA under the RCA programme. Pakistan is happy to participate in the 12th Working Group Meeting of RCA Member States being held at Chiang Mai, Thailand and looks forward to continued increasing role of RCA in the Region.

I would now like to discuss the activities carried out during 1989 under the RCA:

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

Pakistan is participating in the Phase-II of this Industrial Project and the progress achieved during last year in the sub-projects is given below:

1. Non-Destructive Testing (NDT).

The development of Non-Destructive Testing is making a steady progress in Pakistan. Most industries and the government organizations seem to be getting well aware of the needs for inspection, testing and quality control using NDT methods.

A level-2 course on Ultrasonic Testing was organized by the NDT Laboratory from 11 February to 2 March, 1989. 14 participants attended the course out of which 12 passed and were awarded certificates. A level-1 Surface Method Course was organized from 25 March to 6 April, 1989. Out of 15 participants, 12 were awarded the certificates. A NDT Appreciation Course for Managers was organized from 12 - 23 November, 1989. 12 participants attended the course and were awarded the certificates. A level-1 Radiographic Testing Course was organized from 9 - 21 December, 1989. 15 participants attended the course out of which 9 passed and were awarded certificates. These training courses on NDT were held in accordance with the requirements of the certification document which in turn is based on ISO/DIS-9712 which is being patronized by IAEA/RCA for use throughout the RCA region.

During 1990 and 1991, 12 Courses in different fields of NDT are planned. 3 participants from Pakistan attended different Regional courses on NDT in 1989. Pakistan has reached a stage where there has been a need to set up a Pakistan Society for Non-Destructive Testing.

2. Tracer Technology

A National Executive Management Seminar on Industrial Tracer Applications was held from 23 to 25 September, 1989 in which 36 senior officials participated. Three scientists from Pakistan participated in various training courses during 1989.

A proposal for the upgradation of Radiotracer and Radioisotope Application Laboratory has been submitted for consideration under the IAEA technical assistance programme for 1990-1991.

3. Nucleonic Control System (NCS).

An expert was provided by the RCA to assess the Nucleonic Control System in steel industry. RCA is also willing to supply a low cost Nucleonic Control System for the paper industry. Two technical persons one each from paper and steel industries attended Regional EMS on the use of NCS in paper industry and steel industry held during last year.

4. Radiation Technology.

An IAEA Technical Assistance project Pak/8/009 entitled "Radiation Processing of Cable Insulation Materials" has been approved and aims to establish a well-equipped laboratory for the development of radiation processed cable and wire. A programme for holding national and regional training courses in the years 1990 to 1992 in the field of Radiation Processing Application to Cable and Wire is being submitted to the IAEA for consideration. Two technical Managers from the Industry participated in the Regional Training courses held during last year.

B. MEDICAL AND BIOLOGICAL APPLICATIONS OF NUCLEAR TECHNOLOGY.

1. Radioimmunoassay (RIA) of Thyroid Related Hormones.

INMOL Lahore, which is the Coordinating Medical Centre from Pakistan, has established a new unit which is capable of producing standards, I-125 labelled antigens and monoclonal antibodies, and internal and external quality control pools. This unit is also responsible for the supply of these materials to national laboratories and regional laboratories (Bangladesh, Burma, Philippines and Sri Lanka). Moreover, the National EQAS Scheme was upgraded to Regional EQAS Scheme. Pakistan has also supplied to the Agency a locally prepared software package for the preparation of EQAS report. This package has been supplied to Korea and Thailand. Facilities are also available to train scientists and technicians in the field of Immunoassays and Pakistan would welcome suitable candidates from the Region for training purpose if such a request is made. One scientist from Pakistan participated in the Regional Training Course on Optimization of Production Techniques and Distribution Schemes for Reagents for Radioimmunoassay, held at Bangkok, Thailand from 9 - 20 October, 1989.

In order to strengthen the new developments made and to promote educational aspects in the field of RIA, a continued support for the project by the Agency is essential, specially for training of more scientists, experts services, equipment and materials.

2. Proposed Phase-II RIA for Hepatitis - B Diagnosis

Paksitan is interested to participate in this project for the production of monoclonal antibody against hepatitis antigen.

3. Use of Computers in Technitium - 99 Imaging

One Doctor from Pakistan received 2 months training under this programme at Sydney, Australia. This training course was very informative in terms of theoretical and practical aspects in SPECT methodology, cardiac and renal procedures, and basic computer knowledge. This training is being gainfully utilised.

4. Imaging Procedures for Diagnosis of Liver Diseases - Phase II.

This project was awarded in August, 1989. The Japanese counterpart has to provide the liver scintigraphic and ultrasonographic images while the Agency has to provide a phantom for quality control of ultrasound equipment. The quality control procedures for gamma cameras are routinely carried out. One Doctor from Pakistan participated in the Preparatory Meeting on the Evaluation of Imaging Procedures for the Diagnosis of Liver Diseases, held at Seoul, Republic of Korea, from 7 - 9 September, 1989.

5. Inhalation Imaging for the Diagnosis of Respiratory Diseases.

This project was started in October, 1987 with BARC apparatus in which there was a leakage problem, but was solved locally. Independent efforts were made to improve the locally made aerosol generation system.

In the first phase, 31 cases of COPD were experimented alongwith control cases. In the second phase, 50 cases of COPD were studied. In addition, mucociliary clearance of trachea (10 patients) and DTPA clearance studies of lungs (7 patients) were also started.

The Principal Investigator of this project participated in the RCM at Seoul, Peoples Republic of Korea, in September, 1989.

6. Nuclear Techniques for Toxic Elements in Food Stuffs.

Studies on the concentration of toxic and other trace elements were carried out in integrated summer season diet of the inhabitants of an industrial city. It was found that the levels of these elements were generally higher than those of IAEA Mixed Human Diet (H-9). Studies are underway and three research papers have been published. The results of the studies were presented in RCM held in Indonesia in November, 1989.

7. Development of TC-99 Generators Using Low Power Research Reactors.

Evaluation of low temperature sublimation Tc-99 generator was continued. The effect of mesh size on the yield of Tc-99m showed that the material packed with higher mesh sizes chocked the column by forming a disc shape. The problem of contamination of the outer side of neck of the product vial during the collection of sublimed Tc-99 would be overcome by the application of vacuum.

8. Development of Radiation Protection Infrastructure

Two scientists from Pakistan participated in the IAEA/RCA training course on Basic Techniques of Radiation Protection, held at Tokai, Japan from 16 - 27 October, 1989. During the course, basic concepts on radiation dosimetry, environmental monitoring and radiation control in nuclear facilities, supplemented by extensive practical exercises were introduced to the participants.

9. Radiation Sterilization for Tissue Grafts

This project was successfully completed in June, 1989. The results on clinical use of the freeze-dried radiation sterilized amnion in few cases of extensive burns were encouraging. There were no significant differences in NMR spectra of the fresh,freeze - dried and radiation sterilized amnion. The treated amnions were stored for upto 2 years without deterioration in quality and sterility.

10. <u>Care and Maintenance of Nuclear Medical Instruments.</u>

This project was started in December, 1988 and is a part of the Coordinated Research Programme on Research and Development in the methods for Basic care, Preventive Maintenance and Operative control of Nuclear Medicine Equipment. All Nuclear Medical Centres in Pakistan are participating in this project with INMOL Lahore as the national coordinating Institute. The participating Centres have been asked to adopt the standard procedures for preparing the inventory and some suggestions for improvement in the existing situation regarding repair and maintenance have been given. A National Training Course on Nuclear Instruments Maintenance was conducted from October 30 to November 12, 1989 with the assistance of the RCA in which 23 participants from all Institutions in Paksitan attended. Apart from the local faculty, 4 experts from IAEA delivered lectures to the participants, which was followed by extensive practical training.

C. <u>AGRICULTURAL PROJECTS</u>

1. <u>Food Irradiation Process Control and Acceptance (RPFI III).</u>

A research contract proposal on Food Irradiation Process Control and Acceptance has been submitted for consideration by the Agency. The Principal Investigator is expected to participate in the RCM to be held in Bomby, India in the 3rd week of March, 1990 to discuss the future strategy for food preservation for the RPFI Phase-III.

2. <u>Improvement of Grain Legume Rhizobium Symbiosis, to Fix Atmospheric Nitrogen.</u>

A research contract on Screening with Nuclear and Other Techniques for High Yielding Disease Resistant Varieties of Mungbean, Blackgram and Chickpea with Improved N_2 Fixation Capability has been awarded by the Agency under the above UNDP-funded project. NIAB Faisalabad will hold the Workshop under this project from May 2 - 11,1990.

3. Integrated Control of Tropical Plant Viruses with Nuclear Techniques.

Pakistan is interested to participate in this project. NIAB Faisalabad is working on different aspects of legumes and will be interested to work on the control of yellow mosaic virus in legumes.

New Project Proposals

1. Regional Programme to Strengthen Research on Animal Production&Disease Diagnosis in Asia through Application of Immunoassay Techniques.

NIAB Faisalabad has a programme on health and reproduction of farm animals particularly the goat and has great interest in participating in this programme particularly on animal reproduction.

2. Regional Asian Project on Nitrogen Fixing Trees for Increasing Soil Fertility, Crop and Fuel Wood Production.

A research project under the Agency's CRP on the Management of Nitrogen Fixation Trees for Restoring and Managing Soil Fertility was submitted by AEARC Tandojam to the Agency in December, 1988 for consideration. However, no action has yet been taken on this project.

In addition, another research project on Nitrogen Fixation in Fast Growing Trees in Saline environments is under consideration by NIAB Faisalabad.

D. RESEARCH REACTOR BASED PROJECT

1. Research Reactor Utilization

This project needs to be carried out with increased emphasis in the RCA. Several countries in the Region have research reactors in operation while some of the countries are still in early stages of establishment. There is, therefore, a need to explore the possibility of short term visits of scientists involved in research reactor utilization from one country to the other in such fields as Neutron Diffraction and Scattering, Neutron Radiographic, and Nuclear Structure Studies using Neutrons. The funds for the visits of scientists should be borne by the RCA.

E. ENERGY BASED PROJECTS

1. Nuclear Power Project Planning and Implementation (KAERI Training Courses).

One Senior Engineer from Pakistan participated in the above Course held at KAERI, Daejon, Republic of Korea, from 23 October to 10 November, 1989.

2. Energy and Nuclear Power Planning

One scientist from Pakistan participated in the 3rd Regional Workshop on Energy, Electricity and Nuclear Power Planning, held at

Beijing, Peoples Republic of China from 4 - 8 September, 1989. He also presented a paper on Recent Work in Pakistan on Projection of Medium to Long Term Power Demand for Electric System Expansion Planning Studies.

During the 11th RCA Working Group Meeting, Pakistan had offered to host a Regional Training Course on Electric System Expansion Planning during autumn of 1990 or 1991. In the light of the subsequent contacts with the RCA Coordinator, it has been decided that the course will be held at Lahore during 1991 with Water and Power Development Authority (WAPDA) being a local co-sponsoring agency. The technical, financial and administrative arrangements for this activity will be looked after by a National Committee comprising representatives of (i) Energy Wing of Planning Commission, Government of Pakistan (ii) WAPDA and (iii) PAEC.

F. OTHER COMMENTS

1. The idea from Pakistan in establishing Industrial Forum will help in the organization of National Conferences for participants from all types of industries such as Radiography, Tracer Technology, NTD, Radiation Technology and Nucleonic Control System. However, RCA can extend help to such National Industrial Forums in the form of one or two experts widely experienced in the overall applications of Nuclear Techniques to Industry who may deliver general review lectures to such a Forum alongwith the national experts. RCA may also extend grants as a token of support to the project. It is considered that such Forum may be held by each country at intervals of one or two years.

2. A very successful RCA Seminar was held at Jakarta, Indonesia in June, 1988. This Seminar brought out important points which were useful for improvements in the project implementation. Pakistan again suggests that another RCA Seminar-II may be organized in 1991 on similar lines as before.

In conclusion, Paksitan wishes to express its satisfaction with the implementation of various RCA activities so far. Pakistan fully supports RCA activities and has great desire to further promote regional cooperation in peaceful uses of nuclear energy. On behalf of Pakistan, I would like to thank the Government of Thailand for hosting 12th RCA Working Group Meeting and we look forward to continued cooperation under RCA.

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COUNTRY STATEMENT OF THE PHILIPPINES
12th Working Group Meeting of RCA Member States
Chiang Mai, Thailand March 19-22, 1990

PROJECT PARTICIPATION

The Philippines as a signatory to the RCA agreement is participating in the following activities:

1. Regional UNDP Industrial Project

    1.1 Tracer Technology in Industry
    1.2 Nucleonic Control Systems
    1.3 Non-Destructive Testing
    1.4 Radiation Technology

2. Medical and Biological Applications

    2.1 Use of Computers in Tc-99m Imaging
    2.2 Radioimmunoassay of Thyroid Related Hormones
    2.3 Inhalation Imaging for Diagnosis of Respiratory Diseases
    2.4 Development of Radiation Protection Infrastructure
    2.5 Compilation of Anatomical, Metabolic and Physiological Characteristics of Reference Asian Man
    2.6 Radiation Sterilization for Tissue Grafts
    2.7 Care and Maintenance of Nuclear Medicine Instruments
    2.8 Imaging Procedures for Diagnosis of Liver Diseases (Phase II)

3. Agricultural Projects

    3.1 Nuclear Techniques to Improve Domestic Buffalo Production
    3.2 Asian Regional Co-operative Project on Food Irradiation (RPFI Phase III)

4. Research Reactor and Energy-Based Projects

    4.1 Research Reactor-based Projects

        4.1.1 Research Reactor Utilization
        4.1.2 Basic Science Using Research Reactor

    4.2 Energy-based Projects

        4.2.1 Energy and Nuclear Power Planning

STATUS OF PROJECTS

I. Regional UNDP Industrial Project

1.1 Tracer Technology in Industry

The Third National Coordinators' Meeting (Tracers and Nucleonic Control Systems) was held at the Baguio Country Club, Baguio City, Philippines on 19-20 February 1990. Ten National Coordinators (NCs) from developing countries, 2 NCs from developed or donor countries, 1 expert from Australia and the Project Coordinator attended the meeting. Work plans for 1990 and 1991 for Tracer Technology and Nucleonic Control Systems were finalized and strategies for Phase III formulated.

A National Executive Management Seminar (NEMS) on Tracer Technology in Mining Industry was conducted at Philex Minesite, Benguet, Philippines on 26-28 February 1990. The use of Tc-99m and Cs-137 for measuring flow-rate and thickness, respectively, in pipelines was demonstrated during the 3-day Seminar. Nine engineers from Philex, Atlas and PNRI attended the Seminar.

1.2 Nucleonic Control Systems

The 2nd Regional Executive Management Seminar (REMS) on Nucleonic Control Systems in Mineral Processing was held at the Baguio Country Club, Baguio City, Philippines on 21-23 February 1990. Nine executives and managers from 8 Member States, 12 NCs and 3 experts from Australia and India participated in the Seminar.

1.3 Non-Destructive Testing

The main activities performed in this subproject are in the areas of training and certification of NDT personnel.

A) Training

In 1989 the country hosted its first Regional Training Course (RTC) on Ultrasonics Testing, Level 3 on March 6-24, 1989 with 14 participants in attendance. Participants were also sent to RTC-RT3 in Kuala Lumpur, Malaysia on September 4-22, 1989, a Regional Workshop in Bandung, Indonesia on the fabrication of test pieces on November 6-17, 1989 and a Regional Workshop on Non-Destructive Examination of non-metallic materials on September 25-29, 1989 held in Tokyo, Japan.

For 1990 the following training courses and related activities are planned:

March 7 -------- Symposium on NDT Certification
April 16-May 4 --National Training Course on RT-2
May 16-27 -------National Training Course on UT-1
June 4-22 -------Regional Training Course on RT-3
Aug. 6-24 -------National Training Course on UT-2
September---------Certification examinations (tentative)
Oct.22-Nov.29----Regional Training Course on SM-2
Nov. 9 ----------PSNT Convention

B) Certification of NDT Personnel

In 1989 a national certifying body (NCB) was organized with the support of the local NDT Society, the Philippine Society of Non-Destructive Testing. The NCB takes over the functions of certification which was handled before by a national coordinating committee on NDT (NCC), a body representing varied types of organizations engaged in or interested in the promotion of NDT.

1.4 Radiation Technology

A) Radiation Curing

Implementation of the project started in 1988 with the visit of Prof. J. Garnett and with the Forest Products Research and Development Institute of the Philippines (FPRDI) as the major proponent. This year a UV lamp is expected to arrive and will be installed at the Institute for demonstration and training. A senior staff of the project will attend a Regional Executive Management Seminar on Radiation Curing in Jakarta, Indonesia on March 19-21, 1990.

B) Medical Sterilization

A National Training Course on Radiation Sterilization is planned in September or October of this year. The Course will need one or two experts for lectures on microbiology and radiation sterilization practices.

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A quality assurance manager from Adamson & Adamson, Inc., a manufacturing company of medical supplies in the Philippines, attended a Regional Training Course on Quality Control and Sterility Assurance held in Bangkok on 13–20 February 1989.

C) Electron Beam Treatment of Flue Gases

This activity was started in 1989 when inquiries were sent to the National Power Corporation and the Philippine National Oil Company as regards their interest and opinion on the subject. Both firms indicated interest in the visit of a mission to be sent under the project possibly this year. A one-day National Executive Management Seminar will be scheduled in conjunction with this mission.

2. Medical and Biological Applications

2.1 Use of Computers in Tc-99m Imaging

The Philippines' participation in this project is in the attendance at training courses on the subject. A medical technologist from a private hospital with nuclear medicine laboratory attended the second training course in Australia.

2.2 Radioimmunoassay of Thyroid Related Hormones

The project counterpart attended the National Coordinators Meeting held at Chiang Mai, Thailand on 12–16 March 1990. A PNRI participant attended a training course on the Optimization of Production Techniques and Distribution Schemes for Reagents for RIA.

2.3 Inhalation Imaging for Diagnosis of Respiratory Diseases

A study validating earlier studies of aerosol scans in India with the use of the BARC aerosol generator was performed under this project.

Perfusion and aerosol lung scans were performed in 10 normal subjects (mean age - 28 years) and 40 patients (mean age - 58 years) with a diagnosis of chronic obstructive pulmonary diseases based on history, physical examination, chest x-ray and spirometry. Perfusion scan was done with Tc-99m-labelled macroaggregated albumin. Aerosol scan was performed with Tc-99m-phytate nebulized through the (BARC) aerosol generator.

The study validated the experience in India and demonstrated the BARC aerosol generator as an ideal equipment in performing inhalation lung scans.

2.4 Development of Radiation Protection Infrastructure

The Philippines has expressed support to the project since the Project Formulation Meeting held in Tokyo, Japan. Philippine participants were also sent to subsequent training courses and workshops organized by the IAEA in cooperation with the Governments of Australia and Japan. The Philippines would like to express its desire to participate in the forthcoming coordinated research programme which is to be highlighted by an intercomparison run of personnel dosemeters with the objective of improving the accuracy of personnel dose assessment using films or TLDs. This is not only timely but also an extremely necessary activity to further strengthen radiation protection in the RCA region.

2.5 Compilation of Anatomical, Metabolic and Physiological Characteristics of Reference Asian Man

Age-and-sex specific data on the height and weight of the total body were compiled from files of physical examinations of students at a private university for the year 1987-88. Data on the mass and dimensions of internal organs have not been collected.

Calculation of nutritional intake, by age and sex, was performed using dietary consumption data from five barangays in a province of the Philippines.

2.6 Radiation Sterilization of Tissue Grafts

A bone and tissue bank constructed in the compound of the Philippine General Hospital will be inaugurated this month. These grafts are used in reconstructive surgery. The project counterpart together with 3 other participants from Philippine hospitals attended an IAEA-RCA Regional Workshop on Radiation and Nuclear Techniques for Sterilization and Clinical Quality Control of Tissue Grafts in Tissue Banking held in Bangkok, Thailand on 13-22 November 1989.

2.7 Care and Maintenance of Nuclear Medicine Instruments

The activities performed under this project are:

a. Equipment Inventory - An inventory was made in eight hospitals in the country, six are government-owned and two private institutions. The status of the instruments, whether functioning or not, as well as the instrument age, was also looked into.

b. Assessment of personnel capability for maintenance- The personnel profile of the Nuclear Medicine Sections and the capability of the Institution wherein the Nuclear Medicine Section is located have been assessed. The nuclear electronics training course conducted by PNRI and which was developed under a previous RCA project was modified into a 50-50 ratio of theoreticals to practicals to suit present needs.

c. Logbook Keeping- It was found that there was a systematic recording of calibration checks, which are only function checks done before an instrument is used. When the instrument starts malfunctioning, no details of the malfunction nor of the repair had been recorded.

2.8 Imaging Procedures for Diagnosis of Liver Diseases

The Chief Scientific Investigator of the research contract on "Quantitative Evaluation of Nuclear Medicine Imaging Procedure for the Diagnosis of Liver Diseases in the Philippines" attended the preparatory Meeting on Evaluation of Imaging Procedures for the Diagnosis of Liver Disease- Phase II which was held in Seoul, Korea on September 7-9, 1989.

3. Agricultural Projects

3.1 Nuclear Techniques to Improve Domestic Buffalo Reproduction

The project counterpart attended the Final Research Coordination Meeting on the Use of Nuclear Techniques to Improve Domestic Buffalo Production in Asia held in Queensland, Australia on 20-24 February 1989.

3.2 Asian Regional Co-operative Project on Food Irradiation

The Philippine Government wishes to participate in the new UNDP-funded Project on Food Irradiation Process Control and Acceptance under the Regional Project on Food Irradiation, Phase III.

Two project proposals from the PNRI and the Food Terminal Inc. were submitted applying for research contracts. The PNRI proposes a study on the "Irradiation of Manila Super Mangoes to Meet Quarantine Regulations".

4. Research Reactor and Energy-Based Projects

4.1 Research Reactor-based Projects

4.1.1 Research Reactor Utilization

The Philippine Nuclear Research Institute is participating in the Coordinated Research Program on Research Reactor Utilization with a project proposal entitled "Incorporation of IBM-Compatible Personal Computers in the PRR-1".

4.1.2 Basic Science Using Research Reactor

The Philippines continues to participate in this project through attendance in the training courses and the workshops held under this project.

4.2 Energy and Nuclear Power Planning

The Philippines participated in the Regional (RCA) Training Course on Electric System Expansion Planning held at Kuala Lumpur, Malaysia on May 15- June 23, 1989 by sending 4 participants coming from MERALCO and NPC.

With the Regional Cooperative Agreement the Philippines has successfully implemented her research projects involving peaceful applications of nuclear energy and other related projects. It is earnestly hoped that the RCA remain a dynamic agreement and will continue its support to developing countries.

COUNTRY STATEMENT OF THAILAND
12TH RCA WORKING GROUP MEETING
CHIANGMAI, THAILAND
19-22 MARCH 1990

Mr.Chairman,

The RCA Working Group has had eleven successful and fruitful meetings among the Member States since its formation. Now we are here in Chiangmai for the Twelfth RCA Working Group Meeting.

During the past year, the Government of Thailand through the active coordination of the Office of Atomic Energy for Peace (OAEP) , Ministry of Science, Technology and Energy has carried out various activities under the RCA Project. The project activities have been overlooked and guided by the Sub-committees under the Thai Atomic Energy Commission (THAI AEC). Thailand has gained benefit in all of its activities. Progress made in various activities in Thailand is summarized as follows.

1. UNDP/IAEA Regional Industrial Project

1.1. Tracer Technology

The Eastern Seaboard Project (ESP) in Thailand is establishing a large petroleum and petrochemical industry complex which consists of the downstream companies to the Natural Gas Separation Plant. It is realized that this is a very good opportunity to promote radioisotope and radiation techniques in this area. So the second field demonstration was planned. The IAEA expert was requested to visit Thailand during 21-25 August 1989 to assist the local tracer group to plan and prepare for industrial demonstration of tracer application in petroleum and petrochemical industries in the ESP. It was recommended that a 2-3 day National Executive Management Seminar for engineers and managers at the ESP immediately followed by a 2-3 day Workshop/ Demonstration on the Use of Radioisotopes and Radiation in Industries should be carried out in the first half of 1990. The areas of interest are flowrate measurement, residence time distribution, mixing studies and column scanning.

1.2. Non-Destructive Testing

At present, the people who involve in NDT work in Thailand estimated to be above 1,500 persons from private sectors, state enterprises and government institutions. A group of NDT personnel (Thai Society for Non-Destructive Testing: TSNT) has been formed to coordinate local activities supported by the OAEP and the Engineering Institute of Thailand under H.M.the King's Patronage (EIT). There are about 200 members in the TSNT. In 1989, Thailand conducted 1 national seminar and 4 national training courses: UT-1, UT-2, SM-1 and SM-2, there were 74 participants in the seminar and 87 in the training courses. In the training courses, 70 participants from 87 had passed the examinations and got the certificates. For the future activities, Thailand plans to have the qualification and certification programme for NDT personnel to meet the international standard.

1.3. Radiation Technology

The implementation of this sub-project which involves both participating and hosting various regional and national activities has been carried out.

The National Research Group (NRG) on Radiation Vulcanization of Natural Rubber Latex (RVNRL) joins the Test and Evaluation Program on RVNRL by conducting experiment on dipping products from RVNRL produced by Takasaki Radiation Chemistry Research Establishment (TRCRE) compared with RVNRL produced by the Project's Pilot Plant in Jakarta, Indonesia. The NRG also participates in the Coordinated Technical Development Programme (CTDP) by carrying out research on safety assessment of RVNRL and effect of non-rubber component on RVNRL.

A National Executive Management Seminar on RVNRL was organized at OAEP during 14-15 December 1989. There were 54 participants; 32 from private sectors and 22 from government organizations. The private sectors show strong interest in RVNRL.

For the Radiation Curing Technology, a fellowship was granted to a lecturer from Chulalongkorn University during late 1989 to prepare facility for the application of UV curing in printing and packaging industry.

The Third Regional Training Course on Industrial Radiation Sterilization -Quality Control and Sterility Assurance will be organized at OAEP during 14-25 May 1990.

A National Executive Management Seminar on Electron Beam Processing of Flue Gases was held at OAEP on 5 October 1989 to make primary investigation on public interest. There were 54 participants; 23 from private sectors and 31 from government organizations. It seems that the public are very well aware of environmental problems caused by flue gases from the combustion of fossil fuel in the furnaces of the electricity generating plant, cement plants and various factories.

In setting up of the Regional Network for Calibration of Process Control in Industrial Radiation Sterilization, an expert from OAEP attended the Expert Advisory Group Meeting in Japan during 19-23 February 1989 for preliminary investigation and drafting of documents. At present, the high dose Secondary Standard Dosimetry Laboratory at

OAEP is providing the implementation of calibration method and practical routine dosimetry to be used for quality control in high-dose applications in Thailand.

1.4. Nucleonic Control Systems (NCS)

Thailand was selected to be the training and demonstration centre for the use of NCS in coal processing at Mae Moh Lignite Mine of the Electricity Generating Authority of Thailand (EGAT) in Lampang. The OAEP and the EGAT are jointly responsible for organizing the executive management seminar (REMS), workshop (RW) and training course (RTC) each year in 5 consecutive years for the RCA Member States commencing from 1989-1993. The project of the use of NCS in coal processing was inaugurated on 1 November 1989 at Mae Moh Lignite Mine of the EGAT in Lampang Province. After inaugural ceremony, the first series of regional executive management seminar (REMS), workshop (RW) and training course (RTC) of the use of NCS coal processing had been organized during 1 November - 22 December, 1989. There were 5 participants in the REMS, 5 in the RW and 6 in the RTC from 7 RCA Member States. The courses were achieving the stated objectives.

A Regional Executive Management Seminar (REMS) on the use of Nucleonic Control Systems in paper industry was held in Thailand during 6-8 September 1989. There were 7 participants from 6 RCA Member States attending the seminar.

A National Executive Management Seminar (NEMS) on the Use of Nucleonic Control Systems in Civil Engineering was held in Bangkok during 10-11 August 1989. There were 33 participants from both governmental and private sectors attending the Seminar.

2. Medical and Biological Applications of Nuclear Techniques

2.1. Radioimmunoassey (RIA) of Thyroid Related Hormones

Thailand is one of three countries that was selected to be the External Quality Assessment Centre of the Region. There are 16 laboratories joining the centre for project utilization including Sri Lanka and Myan Ma. The Third National Coordinators Meeting was held at Chiangmai during 12-16 March 1990.

2.2. Nuclear Techniques for Toxic Elements in Foodstuffs

Determination techniques were developed in connection with neutron activation techniques both instrumental and radiochemical neutron activation analysis, ion-exchange chromatography, direct combustion technique as well as preconcentration on activated carbon and flame atomic absorption technique. This Project commenced in 1986 and terminated in 1989. The toxic elements in 445 samples comprising of various kind of vegetables, meat and marine products, beans and peas, rices and drinking water were analyzed by those techniques.

2.3. Imaging Procedures for Diagnosis of Liver Diseases Phase II

After Research Coordination Meeting held in Republic of Korea during 7-9 September 1989, 93 liver images by radionuclide scintigraphy method and ultrasonography method from the project were received for interpreting in January 1990. These samples are planned to be interpreted by 15 physicians and will be finished within 6 months.

2.4. Care and Maintenance of Nuclear Medical Instruments

The activities in Thailand fall into 2 categories, maintenance and spare part inventory. Nuclear medical instruments information has been collected to formulate maintenance planning and arrange for the availability of simple spare parts and electronic components needed by the medical units involved. In connection with the man-power development, OAEP has planned to organized a national training course on Nuclear Instruments Maintenance during 23 July -3 August 1990.

Thailand is also actively participating in other projects in the field of medical and biological applications of nuclear techniques such as the use of computers in Tc-99m imaging, improvement of cancer therapy, inhalation imaging for the diagnosis of respiratory diseases, development of radiation protection infrastructure and radiation sterilization for tissue grafts.

3. Food and Agriculture

Thailand is participating in all projects in the field of food and agriculture and also supports the new project proposal in this field.

4. Research Reactor and Energy Based Projects

Reseach Reactor Utilization

One regional training course on research reactor utilization was organized at OAEP during 27 November- 22 December 1989. There were 16 participants from 10 Member States attending the course.

5. The New Projects

As for the new project proposals, Thailand welcomes and supports all new project proposals.

6. Other Comments

I. UNDP/IAEA Regional Industrial Project

Since the UNDP/IAEA Regional Industrial Project Phase I and Phase II has fruitfully supported the research and development for the application of radioisotope and radiation in industry in all RCA Member States, the project should be continued and extended to Phase III with the on-going activities and the new project proposals related to this field. A future effort should be made on the technical public relation programme for the safety of public and benefits of nuclear and radiation technology. The programme may be implemented by means of document dissemination and video presentation.

II. Medical and Biological Applications of Nuclear Techniques

a. All projects in the field of medical and biological science should be continued.

b. Thailand supports the coordinated training and exchanging of information programmes on RIA of thyroid related hormones and viral hepatitis B antigen.

c. Thailand supports the collaboration programmes in Nuclear Medicine, the programmes will include the field of medical physics, imaging computer, nuclear medicine clinic and various applications of iodine.

d. A regional centre (Instrumentation and Training Centre) should be established in the region to act as a service station and training institute. The centre would also be able to promote mutual regional coorperation.

In conclusion, Thailand will continue to be an active participant in RCA, and supports further extension and expansion of RCA activities in the future.

Thank you.

COUNTRY STATEMENT -- VIETNAM

12th RCA WORKING GROUP MEETING
CHIANG MAI, THAILAND, 19-22 MARCH 1990

Mr. Chairman, Distinguished Delegates,

It is my sincere pleasure to be here, among all representatives of the RCA Member States, to make together an objective assessment of the progresses achieved in the working programme of last year and to propose relevant activities for next year.

It is evident that our National Programme for Peaceful Uses of Atomic Energy has become more and more effective under the auspices of the IAEA, and especially in the RCA framework, the subject on which I would like here to emphasize.

At this 12th RCA Working Group Meeting, I would like to present briefly Vietnam's activities connected with RCA Programmes during 1989-1990.

I. UNDP/RCA REGIONAL INDUSTRIAL PROJECT.

Vietnam has deployed its preliminary efforts in all 4 subprojects within the scope of this UNDP Industrial Project, and seeing the appreciable benefits which could be gained from it, we are drafting a request for UNDP assistance and express our longing and hope on its official approval.

1. NON-DESTRUCTIVE TESTING (NDT).

Along with the progress of science and technology, NDT techniques have found more and more prospective applications in the national industry. Two groups of NDT in the southern and northern parts of Vietnam have been relatively active in pursuing the project objectives. NDT contracts carried out with various industrial branches, viz. checking the welds of boilers, determining the quality of concrete, roads, quality control in shipbuilding, etc. have been highly appraised. Three NTC's on RT-1 and UT-1 have been organized in Ha Noi (2) and Ho Chi Minh City (1) during the last 3 years. The NDT Society in Ho Chi Minh City was recently established. Two NTC's on UT-2 and RT-2 will be held in 1990. The ET, PT and MT are to be applied in practice.

2. TRACER TECHNOLOGY.

The Isotope Hydrology Group of the Center for Nuclear Techniques (HCM City) has used tracer techniques to carry out investigations on groundwater in the Mekong delta. About 130 groundwater samples have been collected, measured and analyzed which provided valuable data for estimating the origin, discharge rate, direction and infiltration velocity of groundwater...

Besides, the tracer group of Dalat NRI has begun late in 1989 preparatory work on investigation of the development and bed-load transport of sediment in rivers, reservoirs and ports in the southern part of Vietnam by using radio-isotope tracer techniques.

Ba-131 has been used by the tracer group of DNRI to determine the optimal mixing time in a rotary mixer (750 kg capacity) of raw materials destined for a glass pool furnace. This work has benefited the Dien Quang Electric Lamp Co. in obtaining an increase in the homogeneity of glass tube product by about 20%.

At the Ha Noi Institute of Physics, the radio-isotopes Eu-152, Tb-160 and Tu-170 have been used as tracers for determination of the efficiency of rare earth separation from minerals by the precipitation method.

3. RADIATION PROCESSING.

The applications of gamma irradiation techniques have been found in:

- Radiation cross-linking of polyethylene, resulting in experimental production of 10,000 pickers for textile mills;
- Leather treatment and curing by irradiation;
- Radiation vulcanization of natural rubber latex (RVNRL) for experimental production of surgical gloves;
- Sterilization of medical products, such as surgical suture, surgical gloves, IUD's, traditional medical raw materials, tissue grafts, etc..

The above-mentioned laboratory results and trial production permit further development to a pilot or industrial scale irradiation facility for sterilization of medical products and radiation processing of materials. A feasibility study has come to the conclusion that a 300 Kci gamma source would answer to the needs of Ho Chi Minh City and the Southern part in the near future.

4. NUCLEONIC CONTROL SYSTEM (NCS).

NCS is only at a preliminary stage of development. The Institute of Nuclear Technology in Ha Noi has designed and installed some coal ash measuring gauges in QC laboratories of Quang-Ninh coal mine. An NTC on coal ash gauge will be organized in 1990. Applications of NCS in the paper, cement, chemical (especially plastic) industries and in civil engineering should be introduced shortly and deployed on a reasonable scale. The use of level and thickness gauges could be a suitable starting venture.

II. MEDICAL AND BIOLOGICAL APPLICATIONS.

1. NUCLEAR MEDICINE.

On implementing the project RAS/86/073, we have successfully applied the freeze-dried gamma-irradiated amniotic membranes for clinical uses in burn treatment. Nuclear techniques have also been used in cancer treatment and diagnosis of liver diseases. A few Vietnamese specialists have been trained through RTC's held by RCA Program in this area. But we are acutely in short of RIA kits and imaging equipment. Realistic assistance from the Agency within the framework of RCA, in terms of training, experts and relevant equipment would be highly appreciated.

Concerning nuclear medical equipment required by various hospitals in the country, the Nuclear Research Institute in Dalat has come partly to the rescue by providing them with some locally made, low-cost equipment such as dual-channel renographs, SCA's for in-vivo and in-vitro counting, monitoring equipment, etc. It is worth mentioning that during 1989, two new nuclear medicine laboratories were created in south Vietnam, one supported by the IAEA. Another one in the Mekong delta is to be inaugurated early this year. These laboratories got strong support from the Dalat NRI, in terms of expertise, materials and equipment.

2. DEVELOPMENT OF Tc-99m GENERATORS.

The Dalat NRI has produced portable chromatographic gel-type Tc-99m generators using Titanium-(Mo-99) molybdate and Zirconium (Mo-99) molybdate column packing materials. 200 mci activity generators were supplied to hospitals on a regular basis. In order to support the application of Tc-99m in clinical diagnosis, Tc-99m-labelled pharmaceutical kits have been developed and produced, namely Phytate, Gluconate, Pyrophosphate, DMSA, HIDA, etc.

3. STRENGTHENING OF RADIATION PROTECTION.

The draft regulation on Safety for Nuclear Materials Transportation has been approved and come into force in Jan. 1990. The general inventory of nuclear facilities in the country is under way. We are also setting up a skeleton of management system for radiation protection by which a National Council for Radio-Protection and Nuclear Safety is to be established. Concerning this aspect, VINATOM is carrying out a CRP on 'Compilation of Anatomical, Physiological and Metabolic Characteristics of Reference Vietnamese'.

III. FOOD AND AGRICULTURE PROJECT.

With the imminent commissioning of the first irradiation plant in Ha-noi during 1990 and the approval for construction of another plant in Ho Chi Minh City, the prospects for faster development are open for food irradiation and radiation technology in our country. It will certainly contribute to enhance the implementation of the Project on Food Irradiation

Control and Acceptance (Phase III). For this purpose, we have communicated to FAO the willing of the Government of Vietnam to participate to the Codex General Standard for Irradiated Foods. The Ministry of Health has cleared the following 7 irradiated foodstuff:potatoes, onions, garlic, paprika powder, maize, dry green beans, dried fish.

About the new UNDP/FAO/IAEA project proposal on 'Nitrogen fixing trees for increasing soil fertility, crop and fuel wood production', Vietnam has discussed and pointed out the possibility of co-operation between institutions for its preparedness.

Furthermore, Vietnam has recently applied for an IAEA research contract on control of plant viruses and wishes to participate to this CRP.

IV. RESEARCH REACTOR AND ENERGY-BASED PROJECTS.

Within the scope of the research reactor utilization project, work has been carried out at the Dalat NRI as follows:

1. ENHANCING REACTOR OPERATION, MAINTENANCE AND MANAGEMENT.

The following works are underway:

- Data acquisition and interfacing: design of an acquisition system for measuring fuel surface temperature, to be interfaced with computer. This will serve as the basis for building up a protocol computer system for reactor control;
- Theoretical calculations of fuel burn-up, to be extended to fuel management on PC;
- Thermal-hydraulic studies, aimed at eventual reactor power upgrading measures; 2 fuel elements with 9 built-in thermocouples on each, permitted determination of surface temperature distribution of fuel elements according to their position in the active core.
- Reactor system reliability analysis, concerning mainly with reactor control system, aimed at its prospective renovation and fuel element leakage monitoring.

2. DIRECT UTILIZATION OF RESEARCH REACTOR.

- A new experimental beam facility, with single-crystal silicon filter assembly, permitted to carry out transmission measurements; neutron radiography; elemental analysis by prompt gamma activation analysis. A second experimental beam is to be completed soon, using other suitable neutron filters for nuclear data measurements with quasi-monochromatic fast neutrons.
- Prospective use of reactor for neutron transmutation doping of silicon on the basis of past success of trial runs (nearly 20,000 power diodes produced).

CONCLUDING REMARKS.

Mr. Chairman, Distinguished Delegates,

I have so far presented a sketch of various activities as having been carried out in Vietnam, more or less within the scope of RCA projects. The results are still very modest, but we do hope on faster and more significant progresses in the near future, confident that we are absolutely on the right path -as could be observed by all of us during the last two days- for close and fruitful co-operation among Member States, in a most truthful way.

We appreciate highly the leading role of RCA in promoting this common effort in making atomic energy beneficial to all, and we trust that this co-operative network of Nations will get ever tighter and stronger.

In closing this statement, I would like to express, on behalf of the Vietnam National Atomic Energy Commission, our sincere thanks to the Royal Thai Government and the Office of Atomic Energy for Peace for hosting graciously this 12th RCA Working Group Meeting and making it a success.

Finally, in the presence of the delegates from all RCA Member States, I have the great honour, on behalf of the Government of Vietnam, to invite all delegates to the Thirteenth RCA Working Group Meeting hosted by Vietnam in Ho Chi Minh City next year.

Thank you.

RCA ACTION PLAN 1989-91 (February 1990)*

No	Project/Activities	1989	1990	1991
1.	UNDP Regional Industrial Project	X	X	X
2.	Strengthening of Radiation Protection Infrastructure	X	X	X
3.	Nuclear Techniques to Improve Buffalo Production	X		
4.	Food Irradiation Process Control and Acceptance	X	X	X
5.	Improvement of Grain-Legume/Nitrogen Fixation	X	X	X
6.	Tropical Plant Viruses	X	X	X
7.	Imaging Procedures for Diagnosis of Liver Diseases (phase II)	X	X	X
8.	Improvement of Cancer Therapy (phase II)	X	X	X
9.	Radioaerosol Imaging for Diagnosis Respiratory Diseases	X	X	
10.	Tc-99m Generator for Low Power Reactors	X	X	
11.	Radiation Sterilization of Biological Tissue Grafts	X	X	X
12.	Radioimmunoassay of Thyroid Hormones/Hepatitis B	X	X	X
13.	Computers and Tc-99m Imaging	X	X	
14.	Nuclear Techniques for Toxic Elements in Foodstuffs	X	X	
15.	Research Reactor Utilization	X	X	X
16.	Basic Science using Research Reactors	X	X	X
17.	Care and Maintenance of Nuclear Med. Instruments	X	X	X
18.	Energy and Nuclear Power Planning	X	X	X
19.	Project supporting TCDC	X	X	X

* NOTE: The 1991 RCA prediction is based on the assumption that individual projects will be incorporated within the Agency's 1991-1992 programme.

RCA BUDGET AND BUDGET ESTIMATES (January 1990)

No	Project/Activities	Source	1989 US$K	1990* US$K
1.	UNDP Regional Industrial Project	UNDP(1)	570	833
		TC(2)	120.3	115.8
		JPN(3)	293	300
		AUL(4)	542	215
		CPR	25	25
2.	Strengthening of Radiation Protection	JPN	75	80
		AUL		110
		IND	25	25
		TC	9	
3.	Nuclear Techniques to improve buffalo production	Reg(5)	33.9	-
4.	Regional Project on food irradiation (phase III)	UNDP	-	153
	Workshop	CPR(6)		25
5.	Nitrogen Fixation	UNDP	60	243
6.	Imaging procedures for diagnosis of liver diseases	JPN		
	(phase II)	JPN	50	50
7.	Improvement of cancer therapy (phase II)	JPN	60.9	70
8.	Radioaersol imaging for diagnosis respiratory diseases	IND(7)	50.1	19.5
		Reg		
9.	Tc-99m generator for low power reactors	Reg		
10.	Radiation sterilization of biological tissue grafts	Reg	25	44.5
		TC	96.3	67.95
11.	Radioimmunoassay of thyroid hormones	TC	186.5	160.8
12.	Computers and Imaging in Nuclear Med.	AUL	175.5	175
13.	Nuclear techniques for toxic elements in foodstuffs	Reg	36.8	
14.	BARC Training Course (Isotope Hydrology)	IND	25	25
15.	Care and Maintenance of nuclear med. instruments	Reg	26.7	36
		TC	71.7	73.8
16.	Research Reactor Utilization	Reg		50
		IND		50
		TC	25	25
17.	Workshops/TC funded by Republic of Korea	ROK(8)	50	50
18.	Workshops/TC funded by China			tba**
19.	Energy and nuclear power planning	TC	62.1	64.4
		ADB	93	
20.	Project supporting TCDC	TC	48.6	58.8

*1990 figures are estimates only. In particular they do not imply commitments by donor countries.
**to be announced.

Notes

1) United Nations Development Programme.

2) Technical Assistance and Co-operation Fund.

3) Extra-Budgetary contribution from Japan. The 1990 figures have been made available as a basis for planning and are subject to final approval.

4) Extra-budgetary contribution from Australia. The 1990 figures have been made available as a basis for planning and are subject to final approval.

5) IAEA Regular Budget.

6) Extra-budgetary contribution from the Government of China.

7) Extra-budgetary contribution from the Government of India.

8) Extra-budgetary contribution from the Republic of Korea.

CLOSING REMARK
BY
MR. SUCHAT MONGKOLPHANTHA, SECRETARY GENERAL
OFFICE OF ATOMIC ENERGY FOR PEACE, THAILAND
AT THE 12th RCA WORKING GROUP MEETING, CHIANGMAI, 22 MARCH 1990

IAEA Deputy Director General Dr. Noramly,
Distinguished Delegates, Ladies and Gentlemen,

It was very fitting that special efforts had been exercised the conducting of this 12th RCA Working Group Meeting, its 12th anniversary. The Annual RCA Working Group Meeting is the wellspring to which we return each year to draw renewed inspiration. This cannot be achieved without the company of friends who share similar aspiration and goals.

It was a great pleasure for me being with you all for a whole 4 days. This morning, I feel it a special privilege and a distinct honour to be invited to address this distinguished gathering once again.

As we draw to the close of our meeting, it is my pleasant task to express to you, and through your hard-working and efforts, the profound thanks and appreciation of the Royal Thai Government for the excellent join hands between all distinguished delegates and the close cooperation extended to make the activities successfully today.

The exchanges of creative views that we shared together during 4 days were extremely useful and afforded us an opportunity to benefit from your wisdom and experiences on a wide range of topics related to the RCA Projects. The output derived will certainly be of most importance to the future of technical and industrial development of the RCA Member States and strengthen the regional cooperation between countries.

Consequently, the credit goes to you, Dr. Noramly, Dr. Airey and all distinguished delegates, not only for steering RCA through another successful year, but also for invigorating us in all fields with fresh initiatives which will bear fruit in due time.

I wish also to express my gratitude to Dr. Manoon Aramratana, UNDP/IAEA Project Co-ordinator and Dr. David Kay, Head of Evaluation Section, for their kind assistance and cooperation extended to this meeting. In addition, I wish to thank all chairpersons and our OAEP staff involved, especially all those of the secretariat, for dedicating their time to the organization of this successful meeting.

Ladies and Gentlemen,

Among us today is Dr. Peter Airey, the RCA Co-ordinator, who is mainly responsible for many achievement of the RCA Projects. His outstanding contributions to the projects received well deserved appreciation from all those associated with the project. Dr. Airey will terminate his post of the RCA Co-ordinator from the IAEA at the end of this month, that means this 12th RCA Working Group Meeting in Chiangmai, Thailand is the last official meeting of him and we are extremely honoured having him here.

Dr. Airey,

On behalf of the RCA Member States, and on behalf of your friends at this round table, I would like to express our deepest appreciation to you for your tremendous and valuable contributions to both RCA's activities and member countries. We all wish you success and prosperity in your future endeavour and undertakings.

At this opportune moment, allow me, on behalf of all delegates to present a commemorative gift to Dr. Airey for the good memory of this event. Please be noticed that this gift was already contaminated, not by the radioactivity, but by the appreciation from the bottom of our hearts. So, please do not de-contaminate it.

Ladies and Gentlemen,

Before closing this remark, may I take this opportunity to extend the invitation, on behalf of the government of Vietnam, to all of you to participate in the 13rd RCA Working Group Meeting, to be honourably hosted by the Government of Vietnam, in Ho Chi Minh City, probably in the first week of March, during 4-7 March 1991, details of which will be informed to your countries accordingly. I hope you all will be able to devote once again a great portion of your valuable time to attend the meeting which will certainly provide an important and informative output. Therefore, we will meet again at the 13rd RCA Working Group Meeting, in Ho Chi Minh City. Hope to see you there. Thank you.