ARCAL

ACUERDO REGIONAL DE COOPERACION PARA LA PROMOCION DE LA CIENCIA Y LA TECNOLOGIA NUCLEARES EN AMERICA LATINA Y EL CARIBE

MINUTA DE LA REUNION TRIPARTITA AFRA/ARCAL/RCA
(Versión Original En Inglés)

VIENA, 16 DE SEPTIEMBRE DE 2001

II REUNION DEL ORGANO DE REPRESENTANTES DE ARCAL

20 DE SEPTIEMBRE DE 2001

ORA 2001-08
SEPTIEMBRE 2001

MINUTES OF THE TRIPARTITE MEETING

AFRA/ARCAL/RCA

16 SEPTEMBER 2001

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1. INTRODUCTION

The Tripartite Meeting was convened at the Austria Centre on 16 September 2001. The participants included Representatives from AFRA, ARCAL, RCA and concerned staff of IAEA. The list of participants is attached in Annex-1.

The IAEA was represented by Mr. Qian Jihui, DDG-TC, the three Regional Co-ordinators: Mr. M. Maksoudi (AFRA), Ms. M. Zednik (ARCAL) and Mr. C. R. Aleta (RCA) and other Agency Officials.

The main objectives of the meeting were:

- To review the progress and current achievements of five projects agreed in 2000 to be implemented in 2001-2002 jointly by AFRA/ARCAL/RCA Agreements for the promotion of TCDC as well as progress of earlier technologies being transferred from among the regions;

- To present the achievements obtained under two successful projects in each Agreement that could be of interest to the others;

- To discuss and agree on proposals for networking among Agreements and proposals for exchange of information and project experience.

The acting Chairperson of ARCAL, Mr. Cesar Tate, Argentinian Nuclear Energy Commission, ARCAL National Co-ordinator, made a few remarks and handed over the chair to RCA representative, Prof. N. Choudhury, RCA Co-ordinator of Bangladesh. Prof Choudhury thanked the Meeting for their confidence in him, and spoke briefly about the RCA activities. He then invited Mr. Qian, DDG-TC, to address the meeting (See Annex-4 for Mr. Qian's opening remarks)

During the opening the DDG-TC, in his remarks, reiterated the purpose of the tripartite meeting as a forum for facilitating the exchange of information among the 3 Regional Agreements; it is not a new organisation or mechanism for carrying out an interregional project; it is to exchange information on technology on selected cases and basis for co-operation. The forum should focus on substance, concrete results and good success stories. The DDG-TC cited some examples of TC supported projects, such as SIT which has gained support of ECOSOC and other organisations; the isotope hydrology applications to help developing countries in water resources assessment and applications in nutrition.

The meeting adopted the provisional Agenda (see Annex-3) and agreed on the following Bureau composition: Chairperson: Prof. Dr. Naiyyum Choudhury, Member, BioScience, Bangladesh Atomic Energy Commission and RCA National Co-ordinator of Bangladesh representing RCA, Dr. Kalumbi Shangula, Permanent Secretary-Ministry of Health & Social Services, Namibia National Co-ordinator for AFRA, and Dr. J. Raul Ortiz Magaña, National Research Institute of Mexico, for ARCAL as Vice-Chairperson.

2. PROGRESS REVIEW OF COMMON PROJECTS ADOPTED IN SEPTEMBER 2000

At the last Tripartite Meeting held in September 2000, the Representatives agreed on the common implementation of the following projects:

AFRA: i) Development of Selected ICT-based Training/Learning Materials in the Field of Maintenance and Repair of Nuclear Instruments.

ARCAL: i) Establishing Quality Systems in Veterinary Testing Diagnosis Laboratory

ii) Geothermal Energy

iii) Standards and Methods for the Production of Safe Radiation Sterilized Tissue Allografts

RCA: i) Inter-connection of AFRA/ARCAL/RCA Websites; DAT in Nuclear Medicine; and Distance Learning in Radiation Oncology

The following presentations were made by each of the Agreement:

AFRA:

The representative of Sudan, in the name of the AFRA Programme, presented a brief report on progress made under the interregional project on development of selected "ICT-based Training/Learning Materials in the Field of Nuclear Instrumentation, INT/0/078." (The above brief report is in Annex-5(a); page 13)

ARCAL:

The ARCAL Regional Co-ordinator, on behalf of the ARCAL Programme, presented a brief status of the three projects which had been assigned in 2000 to be under the responsibility of ARCAL, following the explanation that they are no longer under the responsibility of ARCAL but instead are under the interregional project on "Technical Co-operation Between Developing Countries INT/0/060." The three projects are the following:

1) Establishment of Quality System in Veterinary Testing Diagnosis Laboratory
2) Geothermal Energy
3) Standards and Methods for the Production of Safe Radiation Sterilized Tissue Allografts

A copy of this report is in Annex 5(b); page 15

Much interest was shown by the representative from RCA (Indonesia) on two of these projects (i.e. 1 & 2) as he indicated that he considers that they have technical areas whereby ARCAL and RCA could jointly developed. For the purpose of providing technical information on the projects, technical officers concerned with those two projects will be in touch with the representative of RCA (Indonesia).

RCA:

The RCA report was presented by Malaysia and Australia**.**

The representative of Malaysia, on behalf of RCA Programme and as the Lead Country for TCDC, presented a brief report on the progress made under the project on "Inter-connection of AFRA/ARCAL/RCA Websites."

The above project carried out under the interregional project INT/0/060, started in September 2000 and since then much progress has been made. From 13-15 November 2000, an expert working group meeting was held in Argentina whereby representatives from the three Regional Agreements were present and the report of the meeting is available on-line. Participants of the Tripartite meeting were requested to review the seventeen recommendations put forth in the report so as to see how best to proceed further in this project.

Out of the seventeen RCA Member States, fourteen MS are participating in the website.

The AFRA Co-ordinator informed the Meeting that AFRA website has been completed and is subcontracted to South Africa and it will be maintained at no cost to the AFRA Member States. It was noted that AFRA is in the capacity to design its own homepage and out of its twenty-six AFRA Member States, twenty-two are participating in the AFRA website.

In the case of ARCAL, the website was developed with the assistance of Argentina and the regional co-ordinator commended Argentina for this. It was noted that at the moment, the ARCAL website has mainly basic information and has yet to be fully developed. Out of the twenty ARCAL Member States, eighteen MS are participating in the use of the ARCAL website. The ARCAL website is in Spanish. It was also indicated that ARCAL has a section in the TC Website with information in English which may be consulted. The ARCAL Section in the TC Website is linked to the ARCAL website.

The representative of Australia, on behalf of the RCA Programme, presented a brief report on "Distance Assisted Training (DAT) for Nuclear Medicine Technologists"[1], and "Applied Sciences on Oncology Distance Learning course"[2]. In the case of the nuclear medicine course there are 24 countries participating in 3 regions involving 402 students. ARCAL (Brazil) informed the importance of the course which is also being translated into Spanish and Portuguese. AFRA Co-ordinator cited the recent meeting in Cape Town in July 2001 of DAT project co-ordinators in the 3 Regions, wherein the African countries expressed appreciation on the availability of materials. (The mentioned brief reports are in Annex-5(c); page 16).
In the case of the radiation oncology course, two thirds of the materials have been developed and a pilot course of 5 students in 5 countries (Malaysia, Philippines, Pakistan, Egypt and Argentina) is planned for 2002.

RCA (Indonesia) delegate raised the issue of maintenance of nuclear medical equipment. There was exchange of information on what Latin American and African countries are doing in terms of networking on instrument maintenance. In the case of ARCAL, designated centres in the Latin America region were established to handle maintenance and repair of gamma cameras and cobalt machines in the region. Similarly, in Africa region, AFRA has established specialised team for the maintenance and repair of the above mentioned machines and such specialised services could be

[1] The RCA activities on distance learning are implemented under RAS 6029. The interregional activities are implemented under INT0/060.
[2] This project activities related to the development of the modules is implemented under the RCA project RAS 6/033.

easily mobilised within the African region within a week. The DDG-TC emphasized that countries should not always rely on the Agency assistance for the provision of equipment but such needs from the LDC could be considered by the Agency. He mentioned the Agency policy on supporting a reference centre in the case of radiotherapy. The Agency will continue to provide support to maintenance, safety assessment/control and training.
A project proposed for RCA on tele-maintenance was explained by the Technical Officer. Details of this would be available later.

3. PRESENTATION OF SUCCESSFUL RESULTS ACHIEVED UNDER SELECTED PROJECTS

The successful projects presented by all Three Agreements are as follows:

AFRA 1) Development of Improved Crop Varieties (RAF/5/042)

2) Development of a Borehole Disposal of Spent Sources Under the AFRA project RAF/4/015 on "Strengthening Waste Management Infrastructure"

ARCAL 1) Regional Information Network in the Nuclear Field (RLA/0/017)

2) Quality Assurance in Nuclear Analytical Laboratories (RLA/4/013).

RCA 1) Health Care Programme

2) Improvement of Research Reactor Operation and Utilization

The main results of the above projects are summarized in Annex-6(a); 6(b) and 6(c)

In the case of RCA, the establishment of a RCA regional office in Seoul, Korea during the first quarter of 2002 for an interim period of two years is considered as a major achievements amongst the RCA Member States.

4. NETWORKING AMONG AGREEMENTS. REPORT ON PERIODICAL CONSULTATIONS. PROPOSALS FOR EXCHANGE OF INFORMATION AND PROJECT EXPERIENCE

The members of the three Regional Agreements, AFRA/ARCAL/RCA were requested to review the seventeen recommendations of the expert working group that met in November of last year in Argentina. In response to the recommendations made in the report of the expert working group, it was agreed that another meeting be held amongst the Regional Co-ordinators of AFRA, ARCAL and RCA to further discuss the next course of action for the project on "Inter-connection of AFRA/ARCAL/RCA Websites."

5. PARTICIPATION IN SCIENTIFIC FORUM

DDG-TC encouraged participants of the meeting to attend the Scientific Forum which is scheduled to be held from 18 to 19 September 2001.

6. NEXT TRIPARTITE MEETING

The meeting concurred to convene the next Tripartite Meeting during the week of the General Conference scheduled to be held in September 2002. It was also agreed that it will be a 3-hour meeting from 15:00 to 18:00 on Thursday based on the agenda format established in the past. It was noted that the TC Director for the Division of Europe, Latin America & West Asia (DIR-TCPB) proposed to simplify the meeting to be more focused on the objective of the forum, which is the exchange of experiences between the three Regional Agreements.

As for the sharing of success stories amongst the three Regional Agreements, suggestions were made on the possibility of assessing the best stories amongst the good stories presented by AFRA/ARCAL/RCA. There was also a suggestion to exchange information on thematic areas which can be decided later.

7. CLOSING

The meeting ended at 6:30 p.m. with vote of thanks from the Chair

ANNEX 1

LIST OF PARTICIPANTS TO THE TRIPARTITE FORUM AFRA, ARCAL, RCA

16 SEPTEMBER 2001
VIENNA, AUSTRIA

AFRA

ALGERIA:	Mr. Messaoud Baalioumer
EGYPT:	Ms. Laila Fikri
NAMIBIA:	Dr. Kalumbi Shangula (Chairperson)
MADAGASCAR:	Dr. Wilfrid Rosofoarisona Ms. Raquelina Anoriambololona
SOUTH AFRICA:	Dr. Vuvu Msutwana Qupe
SUDAN:	Dr. Omer El-Amin

ARCAL

ARGENTINA:	Prof. Cesar Alberto Tate
BRAZIL:	Dr. Jose Antonio Diaz Dieguez
CHILE:	Ms. Maria Cecilia Urbina
MEXICO:	Dr. Ramiro Magaña Dr. J. Raul Ortiz Magaña
PERU:	Dr. Conrado Seminario Arce
VENEZUELA:	Dr. Omar Diaz Heredia

RCA

AUSTRALIA:	Dr. John Rolland
BANGLADESH:	Prof. Dr. Naiyyum Choudhury
INDIA:	Dr. K. Raghuraman
INDONESIA:	Dr. Azhar Djaloeis
KOREA (Rep. of):	Dr. John K. Chung
MALAYSIA:	Dr. Nahrul Khair Alang Md. Rashid

IAEA Officials & Staff present

1. Mr. QIAN Jihui – DDG-TC
2. Ms. Alex Volkoff – DIR-TCPA
3. Mr. Paulo M.C. Barretto – DIR-TCPB
4. Mr. M.N. Razley –SH-TCAPS
5. Mr. Mokdad Maksoudi – AFRA Co-ordinator
6. Ms. Maria Zednik – ARCAL Co-ordinator
7. Mr. C. R. Aleta –RCA Co-ordinator
8. Mr. Hernan Vera Ruiz – NAPC
9. Mr. German Piderit – TCPB – LAS
10. Mr. Shamin Chaudhri, – TCPB - TCWAS
11. Mr. Jorge Morales – TCPB
12. Mr. Markku Kemppainen – TCPC
13. Mr. Sujit DEY – Country Officer –TCAPS
14. Mr. Nabil Lutfi – Country Officer –TCAPS
15. Mr. Mukhtar Najat – NAHRES
16. Mr. Y. XIE – NAHU

RCA Office support staff

17. Ms. Mary Tan- TCPA
18. Ms. Concepcion Segura
19. Ms. Gloria Garcia Ramos

ANNEX 2

OBJECTIVES OF THE MEETING:

1) To review the progress and current achievements of the following projects agreed in 2000 to be implemented in 2001-2002 jointly by AFRA/ARCAL/RCA Agreements for the promotion of TCDC, as well as earlier agreed projects

AGREEMENT	PROJECT TITLE
AFRA	• Development of Selected ICT-based Training/Learning Materials in the Field of Maintenance and Repair of Nuclear Instruments
ARCAL	• Establishing Quality System in Veterinary Testing Diagnosis Laboratory • Geothermal Energy • Standards and Methods for the Production of Safe Radiation Sterilized Tissue Allografts
RCA	• Inter-connection of AFRA/ARCAL/RCA Websites & DAT in Nuclear Medicine; distance learning in radiation oncology

2) To share the achievements obtained under two selected projects in each agreement, that could be of interest to the others.

3) To discuss and agree on proposals for Networking among Agreements and proposals for exchange of information and project experience.

ANNEX 3

AGENDA OF THE MEETING:

15:00 Opening Remarks by Chairperson: ARCAL Representative. Hand-over to new Chairperson: RCA

15:15 Remarks by the DDG-TC

15:30 Designation of the Bureau of the Meeting by new Chairperson: RCA Representative

Two Vice-Chairpersons: AFRA and ARCAL

Rapporteur: RCA

Introduction of the Participants

Adoption of the Agenda

15:45 Presentation by the Representatives of the Agreements on transfer of technologies:

a) Review of the achievements obtained during the previous year in the implementation of approved projects for the promotion of TCDC.

b) Presentation of two successful projects implemented in each region, that could be of interest to others.

16:30 Networking among Agreements. Report on periodical consultations. Proposals for exchange of information and projects experience

16:45 Participation in Scientific Forum

16:50 Other Matters and Proposal of Agenda and details for next Meeting

17:00 Break for preparation of report by rapporteur in consultation with Chairperson

17:45 Approval of the meeting report

18:00 Closing.

ANNEX 4

Summary of Remarks made by Mr. Qian Jihui, Deputy Director General and Head of the Department of Technical Co-operation on the occasion of the TRIPARTITE FORUM held on 16 September 2001 from 3:00 p.m. to 6:00 p.m. in Room N Austria Center.

Distinguished Delegates:

1. Once more I am very pleased to have been invited to say a few words on the occasion of this joint meeting of the three Regional Agreements (AFRA, ARCAL and RCA).

2. As many of you may recall the Tripartite Meeting is an initiative proposed by the three Regional Agreements in 1997 which has been supported by the IAEA and is held during the GC every year.

3. The Tripartite meeting is a Forum for facilitating the exchange of information among the three Regional Agreements on their best experiences in the implementation of their TC projects. As indicated in my opening remarks last year, the Tripartite should not constitute a new organization or mechanism for carrying out interregional or regional TC projects.

4. Indeed, the Tripartite Forum of AFRA, ARCAL and RCA have been exchanging information and technologies since a few years on selected cases and this cooperation has already demonstrated the spin off effects of technology developed in one region being applied in the other regions without having to start from the beginning.

5. The nature of this forum requests us to focus on substance with practical experience and concrete results - good success stories which are clear examples of the application of TC initiatives, central criteria and the integration of national development plans with regional interests.

6. I know that each agreement will be presenting today some examples of good stories. I do hope that in future years these examples would also reflect the efforts which are being done in each region to further sustainability, self reliance and how to achieve them.

7. Taking this opportunity, I would like to share some developments of the Agency's efforts in creating more successful stories through national and regional projects:

i) SIT with regard to tsetse in Sub-Sahara and fruit fly in Central America
ii) Application of isotope hydrology for groundwater management in Latin America and Africa.
iii) Nutrition in Asia: Stable isotopes to support national food fortification programmes (ADB, UNICEF, FAO, WHO) ADB launched a project to work out an investment plan for a future WB loan. Chile concentrated on a 1.3 Million target group of people to reduce anaemia from 30 to 5 %. It triggered the Mexican Government to allocate about US $600.000 for an institute to buy two mass spectrometers
iv) Drug resistance detection: More than twenty Member States joined this African Regional Project and it was possible to arrive at a diagnosis much more accurate and in a much shorter time, especially with regard to communicable diseases such as Malaria and TB.

We believe that these kinds of projects will create more significant impact and be able to enhance the profile of non-power nuclear applications, improve the image of IAEA as well as nuclear technology and let the Agency be recognized as partner in development. The results will be attracting more non-traditional donors' financial support and extrabudgetary funding. This will be regarded as the best evidence of the success of our effort in implementing the TC Strategy.
The TC Strategy Phase I has been successfully finished changing from technology to demand driven requests using our established capacity for solving problems. The trend is irreversible and we now need to consolidate.

We are entering Phase II, to fully reach the final objective - to be recognized as a Partner in Development. Since we already changed the direction successfully with many meaningful results, we are a partner in development already, but as such we are not yet fully recognized. WHY?

Because our achievements are still not yet significant enough to attract the attention of Governments and international communities. We have not yet succeeded totally in changing their traditional perception of the role and value of the IAEA in the areas of development. From evidence available we know that we still have difficulty in penetrating the developmental financial aid communities. However, a few encouraging examples have occurred showing that the key to reach this target is the quality of our projects. Here, our experience is that quality is not only reaching end users, achieving concrete results, being cost effective, but also it is creating significant impact, being unique and sometimes playing an indispensable role in solving crucial developmental problems.

Not in all the areas we are able to do so, but we do need a few examples to be able to hoist as our flags. The potentials are existing. You will agree with me that whenever any project can play this role for the Agency and the Institutes applying these nuclear techniques, they should be an example for us in Phase II of the implementation of the TC Strategy and be recognized as priority.

ANNEX 5(a)

(AFRA)

BRIEF REPORT ON PROGRESS MADE UNDER THE INTERREGIONAL PROJECT ON DEVELOPMENT OF SELECTED ICT-BASED TRAINING/LEARNING MATERIALS IN THE FIELD OF NUCLEAR INSTRUMENTATION, INT/0/078

1. Overall objective of the project:

To acquire or to develop ICT-assisted training/learning materials well-adapted to developing countries' environment for training in nuclear electronics, maintenance and repair of nuclear instruments in order to ensure self-reliance and cost-effectiveness.

2. Project strategy:

The project was approved in 2000 for two years 2001/2002 with a budget to cover the cost of development and/or acquisition of selected ICT-based tools for training Member States staff in nuclear electronics, as well as in trouble-shooting of selected nuclear instruments such as power supplies, detectors, counting systems, etc. It consists of two complementary phases: 1) planning phase (6m/m); and 2) development/acquisition/testing phase (18 m/m).

The project conceptual design as well as implementation are making use of the expertise of selected consultants from Africa, Asia, Europe, Latin America, West Asia and USA. A total of 10 consultants currently assist in the implementation of the project activities together with the Agency staff.

3. Progress achieved:

1. *Phase 1* has been completed, including three meetings held in Vienna (11-15 December 2000), in Argonne National Laboratory, USA, 23-27 April 2001, and in Vienna, Austria, 3-7 September 2001. The meetings were attended by consultants from Argentina, Brazil, Cuba, India, Israel, Poland, Slovenia, South Africa, Tanzania and USA.

2. *Sub-contracts* were given to consultants for the development of the following ICT-materials:

- Analog electronics: Prof. J. Pahor, Slovenia
- Power supply: Dr. A. Burr, USA
- Digital electronics, MCAs and microprocessors: Dr. D. Ponikvar, Slovenia
- Radiation sources and radiation interactions: Dr. Clikeman, USA
- Theory and operation of gas detectors: Dr. Clikeman, USA
- Troubleshooting of selected amplifiers and pre-amplifiers: Dr. R. Krasowski, Poland

The above mentioned sub-contracts will provide final products in the form of CD-ROMs, with animation and self-assessment. They will be delivered to the Agency latest 31 December 2001.

3. Sub-contracts are under preparation for the development of ICT tools for troubleshooting of the following nuclear counting systems:

   - TLD readers;
   - liquid scintillation counters; and
   - survey meters.

They will be finalized in September 2001 and given to consultants.

4. Arrangements were made for the developed materials to be tested in Vienna and distributed. to 10 countries in all regions to be used for three months by the trainers. The trainers will then be invited to a two-week meeting in Argonne National Laboratory (ANL) in April 2002 to review and finalize the materials, in collaboration with the developers.

4. 2002 plan of activities:

In 2002, much effort will be devoted to the testing of the developed materials and to the distribution of the selected ones. Training of trainers, as well as training of ICT-experts will also be implemented in 2002.

In parallel to this activity, an assessment of the feasibility and cost-effectiveness of the developed ICT-materials will be performed, the results of which will be reviewed during the project co-ordination meeting foreseen in Brazil in October 2002. The final report of the project will then be endorsed by the meeting and submitted to Member States for consideration.

(ARCAL)

The minutes of the Tripartite meeting held in Vienna on the 30th of September 2000 included two important points:

1. The request to review the achievements obtained in the implementation of approved projects during the previous year ,and

2. The remark made by Mr. Qian Jihui, DDG-TC:

   "The Tripartite should not constitute a new organization or mechanism for carrying out interregional projects. If any Regional Agreement wants to learn and adopt some good experience related to a specific subject and application of a technique, certain regional or national TC projects should be arranged within the existing mechanisms to realize it".

It was at that time decided that the implementation of the following projects was under the responsibility of ARCAL:

ARCAL	• Establishment Quality System in Veterinary Testing Diagnosis Laboratory • Geothermal Energy • Standards and Methods for the Production of Safe Radiation Sterilized Tissue Allografts

Later, these projects were assigned to be implemented under the framework of the interregional project INT/0/060.

In view of the complexity of these projects[3] and the variety of subjects which had been put under one single project umbrella and the fact that the Tripartite Forum should not constitute a new organization or mechanism for carrying out interregional projects (see No. 2 above), the Deputy Director General reassigned last March, the responsibility for the implementation of these activities to be carried out under INT/0/060 and no longer under the responsibility of ARCAL.

Nevertheless, in compliance with the item on this meeting's adopted Agenda, I am pleased to include herewith a brief progress report provided by the officer now responsible for this project:

- Establishment Quality System in Veterinary Testing Diagnosis Laboratory:

The work plan for 2001 contains six activities, four of which have been implemented (1-4). Two activities are expected to be implemented in the coming 5-6 months. Plans are under way to process the translation of the document prepared by the experts (5) and the collection of samples for the inter-comparison Establishment Quality System is in process (6).

[3] In particular, the project "*Standards and Methods for the Production of Safe Radiation Sterilized Tissue Allografts* includes activities on: a) Standards, Legal and Regulatory Systems in Tissue Banking, b) Distance Learning c) Public Awareness and d)production and uses of radiation sterilized tissue grafts

- Geothermal Energy

The work plan contains six activities. Five have been implemented and one was canceled (4) because the document will be prepared using other funds.

- Standards and Methods for the Production of Safe Radiation Sterilized Tissue Allografts

The work plan associated with the production and uses of radiation sterilized tissue grafts contains four activities, all of which have been implemented. Three of the reports are ready and were distributed to all interested parties.

ANNEX 5(c)

(RCA)

Distance Assisted Training (DAT) for Nuclear Medicine Technologies

An inter-regional meeting was held in Cape Town in July, where the progress in the DAT project was discussed. The original group of 12 pilot RCA students has now completed the DAT course. They are to be congratulated on their perseverance as the original course development spanned more than 5 years. The supervisors and country co-ordinators also deserve acknowledgement. All three regions now have active students undertaking the course with currently a total of 402 students, in 177 departments in 24 countries. In the RCA region students in most countries have already progressed to the second stage subjects. Most of these students should complete the course and be assessed in 2002. In the AFRA students will be assessed in the first stage subjects later this year. ARCAL students started the course in 2000 and are progressing well. Students are currently using versions of the materials in English, Chinese, Korean, Spanish and Portuguese with translation to French in progress.

The most important considerations relate to the recognition of the students who complete the course and sustainability of the training. In several countries the course ins now being incorporated in formal courses offered by educational institutions. The materials are proving useful for other professional (trainee medical staff and scientists) and the suggestion has been made that the course could be useful in formalizing the training offered in fellowships, in cases where local support is not available. Materials now include worship toolkits and assessment guidelines as well a library of exam questions, further encouraging individual countries to continue the training. The materials continue to be refined (e.g. with the addition of document navigation and cine sequences in the CD/web version). There is very positive feedback on the improved performance and attitude who are undertaking the programme of training

	Participating Countries	**Participating departments**	**Number of students**
RCA (Asia)	8	124	294
ARCAL (Central and South America)	11	47	96
AFRA (Central and North Africa)	2 (+3)	3 (+3)	11
TOTAL	24	177	401

(RCA)

Applied Sciences on ONCOLOGY Distance Learning course
STATUS REPORT 11 September 2001

MODULES

Drafts for two thirds of all modules have now been received. It is expected that most of the remainder will be received within 4 weeks.

REVIEWING PROCESS

Return of first drafts is up to date. (Two new modules have been received this week, these have yet to be reviewed and returned to authors). This process has been slowed down as most of the modules are much larger than the expected 6 pages, most are in fact a minimum of 15 pages and some are over 30.

The majority of modules have been supplied just as "slabs of text" and have required comprehensive instruction regarding the use of multiple choice questions, compare and so on. Hopefully the second returns will be more suitable for interactivity.

ANIMATION/GRAPHICS

Work is being done with two multi-media experts to deal with the graphics and animations.

The front end of PHYSICS has been designed and a completed module will be ready for author's review of shortly.

A sample graphic for the anatomy section was recently forwarded.

PERMISSION TO REPRINT

Basically there has been a good response from publishing houses, but of course there are always one or two who do not respond. These are being followed up regularly.

Future tasks:

1. Reviewing. Reviewers in Member States will assess the CD for relevance, content and comprehensibility.

2. Pilot. A pilot of 5 students in 5 countries is planned for 2002. The countries were decided at the Kuala Lumpur advisory meeting December 1999. There are Malaysia, Philippines, Pakistan, Egypt and Argentina.

ANNEX 6(a)

AFRA SUCCESS STORIES 2000

A. FOOD SECURITY

1. Released improved crop varieties

The AFRA project RAF/5/042 was initiated in 1997 for five years to help AFRA Member States carry out a comprehensive on-station and on-farm assessment of the performance of improved crop varieties obtained through mutation breeding programmes, and to disseminate the varieties which prove to be economically viable and socially acceptable.

The scope of the project goes beyond the assessment of the performance of promising varieties to include the promotion of seed multiplication of released crops, as well as their acceptance by decision-makers and farmers alike.

The following promising crop varieties were selected to undergo the process of assessment at the station and farm levels, side by side with the parent crops:

- sesame: Egypt
- safflower: Egypt
- barley: Libya
- African rice: Mali
- sorghum: Mali
- cassava: Ghana
- cocoa: Ghana
- lentils: Morocco
- cotton: Sudan
- banana: Sudan
- wheat: Kenya

Almost five years since the initiation of the project, the following improved crop varieties have been officially released in their countries of origin, including multiplication of seeds by state-owned or private companies:

i. ***Sorghum***: Eight improved varieties of sorghum were officially released in 1998 for various desired characteristics such as high nature values, higher yield, drought resistant, lodging tolerant, etc. This was followed by a seed multiplication campaign led by a semi-state-owned company .

   By the end of 1999, 507 farmers in 11 villages received seeds of three of the eight improved varieties for cultivation. In addition, the company has been multiplying the seeds using a plot of 1499 hectares. No reliable data exist today, but it is estimated that the improved varieties cover a significant portion of Mali, particularly in the Fana region which is known for sorghum. Currently, the mutants are under evaluation in Ghana, Burkina Faso and other countries of the west and Central African Network on Sorghum (ROCARS).

In 2000, three additional improved mutants of sorghum were released officially for the South of Mali as they are appreciated for their earliness. The results of the assistance to Mali were published in several scientific papers.

ii. ***Cassava:*** One mutant variety of cassava ('Tekbankye') was released in Ghana in 1998. The released cassava mutant Tekbankye is currently being multiplied for distribution to farmers in Ghana and interested AFRA Member States. This is being carried out both *in vitro* and *in vivo*. The *in vivo* multiplication is being carried out by the Root and Tuber Crop Improvement Programme, which is sponsored by the International Fund for Agricultural Development (IFAD), Government of Ghana and IAEA TCP GHA/5/026. The materials are currently in secondary multiplication sites from where cuttings will be made available to Ghanaian farmers. The *in vitro* multiplication for distribution for recipient's country outside Ghana is being carried out in the Tissue Culture Laboratory at the Biotechnology and Nuclear Agriculture Research Institute. Currently, there is enough material available *in vitro* for distribution for regional exchange to interested countries.

iii. ***Sesame***: Three varieties of sesame ('Taka 1', 'Taka 2' and 'Taka 3') were officially disseminated 3 years ago to 20 sesame growers per year to raise breeder seed and for demonstration trials. In the year 2001 these varieties were officially released and the available seeds from these varieties will be cultivated in about 50 feddan (21 ha) for further multiplication under the farmer fields to raise more certified seed (about 50 growers).

iv. ***Banana***: Two mutant clones of desert banana with higher yield and good quality have been released officially in Sudan in early 2001. Micro-propagation of improved clones has already been started together with an information campaign.

v. ***African rice***: Three improved varieties of African rice selected for their higher yields as well as colour (white instead of brown) have been released officially this year in Mali: three companies will multiply seeds for the next year cultivation season.

2. Improved crops varieties submitted for registration and official release:

a. ***Barley:*** Five drought tolerant mutants of barley in Libya were provided to the Agricultural Research Centre (ARC) in 1997/98 to expedite their release. Two mutant lines of barley with improved yield will be submitted to National Variety Release Committee in Tanzania in 2002 provided the results of micro-malting tests in 2001/2 are positive.

b. ***Cocoa:*** One virus resistant cocoa mutant clone developed in Ghana for possible release in 2003.

c. ***Lentil:*** Three mutants of lentil with high yields, improved biological nitrogen fixation and moderate tolerance to fusarium wilt are submitted for registration in Morocco in 2001.

d. ***Safflower:*** Two spineless mutants of safflower with high yields, high oil content and high oil quality will be submitted to National Variety Trials in the 2002/2003 season.

e. ***Wheat:*** One wheat mutant line (Km 14) is recommended for release in drought-prone environments in Kenya in 2001.

3. Other achievements:

In addition to training about 200 breeders and technicians in various disciplines of mutation breeding and biotechnology, the project helped establish a solid network of breeders and agronomists, as well as 8 *in-vitro* culture laboratories for micro-propagation of various crops. The one in Mali is of particular interest as it is now being used to micro-propagate potatoes for the needs of the country. It covers about 70% of national needs thereby savings significant hard currencies.

A comprehensive study is being undertaken to quantify the impact of the project achievements in terms of socio-economic and scientific spin-offs. This study is expected to be completed before June 2002.

B. DEVELOPMENT OF A BOREHOLE DISPOSAL OF SPENT SOURCES UNDER THE AFRA PROJECT RAF/4/015 ON WASTE MANAGEMENT

As part of the AFRA programme to strengthen waste management infrastructure in African countries, a contract was awarded to the Atomic Energy Corporation of South Africa (NECSA) to investigate the Borehole disposal Of Spent Sources (BOSS) disposal concept. The objective of the project is to evaluate the technical feasibility and economic viability of the concept to be used for the safe disposal of radioactive spent sources.

Phase I of the contract focused on the description of the concept and spent source characteristics of some AFRA countries. This was completed in 1999 and approved by the Agency. Phase II of the contract which was completed in 2000, focused on the evaluation of the concept, with particular emphasis on safety issues. Phase III will validate the concept through a full scale demonstration of the concept facility with real radioactive spent sources.

Description of the BOSS Disposal Concept

Implementation of the BOSS disposal concept requires boreholes at each location where spent sources are to be conditioned. It is thus obvious that the drilling of boreholes will have extensive implications for the implementation of the concept. Equally important is the geology of the country of concern, which will not only influence the site selected for disposal, but also the drilling method that will be applied.

For the BOSS disposal concept to be technically feasible and economically viable, it should fit into an integrated waste management framework for spent sources. Such a framework has been defined with the idea that it should be used as part of the implementation of the concept in AFRA countries. Therefore, guidelines are identified and recommended on waste package design considerations.

The study of the BOSS disposal concept considers two aspects, namely the repository and the waste package itself. An important assumption that was made in the development of the waste package is that ^{226}Ra is probably the most demanding source and that if the concept is acceptable for Ra, then it will also be for the other sources. This led to a description of a reference design for the disposal ^{226}Ra sources.

The implementation of the concept addresses the preparation of the borehole, the conditioning of the sources, the disposal operations and radiation protection that need to be taken. This is followed by an exploration of the requirement of a mobile conditioning facility.

Other aspects that come out as part of the technical evaluation of the concept is that

- the concept is relatively simple to implement;
- a lot was learned from other borehole disposal concepts for spent sources, although the BOSS disposal concept seems to provide a more robust solution, especially for the disposal of ^{226}Ra;
- drilling boreholes in Africa is not a big problem although certain logistical problems may occur;
- PVC casing is preferred with advantages in terms of weight and perseverance as well as preserving the waste container;
- wider boreholes can be drilled if required;
- conditioning of the sources is relatively simple and the experience with other similar procedures is useful;
- quality control during the conditioning process is essential, especially for the weld seals and waste form; and
- radiation protection during the conditioning and disposal operations is important.

An attempt was thus made to provide a rough estimate of costs, as one would find it in the life cycle of a radioactive waste disposal facility. For this purpose, the following subdivisions were used (IAEA, 1992):

- Project management
- Licensing
- Siting
- System design and engineering
- Construction
- Operation
- Closure

In addition to these activities, the evaluation of the operational and post-operational (closure) safety of the concept is also included. From the cost estimation, it is clear that a detailed analysis of the costs involved in the implementation of the BOSS disposal concept is difficult at this stage.

The disposal cost expressed in US dollars per cubic meter of waste varies between $ US 57 243 to $ US 99 533 for a disposal volume of 2.14 m^3. As one would expect, this is considerably higher than conventional disposal concepts, mainly because the sum type of activities required for the conventional methods are required for the BOSS disposal concept (e.g. licensing, projects management, siting) and also the very small disposal volume of the concept.

To compare the BOSS disposal concept with conventional disposal methods such as the trench concept is technically not feasible. In the first place, it will be very difficult to justify the disposal of longer lived sources such as ^{226}Ra and ^{241}Am in a near-surface trench, notwithstanding the fact that with the limited volumes, the total activity will be low. Secondly, the volume of waste that would need to be disposed of does not justify a whole trench with a considerably larger disposal volume.

However, if the total cost for the various activities for some well-known sites are compared with the total cost of the BOSS disposal concept, then it is clear that the total cost is orders higher than those of the BOSS concept. However, it should be noted that the two concepts are so different that it is very difficult to compare.

To conclude, the comparison of the BOSS disposal concept with the earth trench disposal concept shows that for the limited volumes of sources found in African countries, the BOSS disposal concept will be substantially cheaper that using a trench. In particular:

- The borehole has a large capacity for sources and it is possible that an entire countries spent source can be placed in one borehole.
- There is high efficiency of use of the available volume.

Preliminary Safety Assessment of the BOSS Disposal Concept

The preliminary safety assessment for the BOSS disposal concept was performed within the framework of the IAEA Co-ordinated Research Program, ISAM. The assessment context makes provision for evaluating the long-term performance of the concept at two sites with very different characteristics - the one at Vaalputs in the unsaturated zone (disposal depth of 45 m) and the other at Pelindaba in the saturated zone (disposal depth at 100 m). At both sites the reference design for the ^{226}Ra sources was implemented.

The results of the analysis indicate that the BOSS design appears to be quite robust in terms of limiting releases to acceptable levels. This was found to be true for disposal in both saturated and unsaturated conditions, although unsaturated conditions appear to be preferable. The implications of the results for waste acceptance and siting criteria are also stated.

The conclusion of the initial safety assessment was that the BOSS concept is robust, and provides a viable concept for the disposal of radium needles. The concept is expected to provide good assurance of safety at real sites. The extension of the safety assessment to other types of spent sources is expected to be relatively straightforward. Disposal of radium needles is believed to be a more severe test of the disposal concept than any other type of spent source.

The preliminary assessment concentrated on ^{226}Ra as the most demanding isotope to cater for in the BOSS disposal concept. Based on the results, it was concluded that the concept would be feasible for most of the other isotopes of importance. However, the question remains: how safe will it be? As part of the second iteration, it is therefore proposed that the other isotopes be evaluated explicitly. This can be in the form of formulating generic nuclide specific waste acceptance criteria or to provide guidance on the containment (waste package) requirement to ensure safety.

The contract for Phase III has been signed and work will start soon. This will last until 2003 as real demonstration will be performed and assessed. Emphasis will also be placed on the cost of the degree of safety required for a concept such as BOSS.

ANNEX 6 (b)

ARCAL SUCCESS STORIES

ARCAL XLII (Project RLA/0/017)
Main Achievements

In the light of the objectives set out for the Project as outlined above, the main achievements during the implementation of the Project were the following:

1. establishment of an electronic network among the 15 participating countries for the exchange of ideas, experiences and questions

2. establishment of another specific electronic network for the purpose of exchanging the full text of nuclear documents in electronic form

3. starting from a minimal exchange in the years **before** 1999, there was an exchange of **168** full text of documents in 1999 and of **777** documents in the year 2000

4. the number of pages transmitted in 1999 was **2622** while the number in the year 2000 were **7164**

5. the contribution of the region to the INIS Database during the 5 years before the Project was an average of **2173** items of literature per year. The contribution during 1999 increased to **3154** and during 2000 to **3603,** thereby showing an average annual increase of about **55.5%** for the biennium of the project over the average for the preceding 5 years

6. to have access to documents not available in the region, arrangements were made for the Information Units to gain experience with the services (electronic and otherwise) from the British Library Document Supply Centre in the U.K. and to routinely use these services

7. the access of the Information Units in the region to the INIS and other databases available through international networks was greatly strengthened by the provision of appropriate hardware, software and training

8. a bibliographic compilation entitled: "Accidents and Incidents in the nuclear area that have occurred in Latin America and the Caribbean" was prepared and is ready for publication

9. a bibliographic compilation entitled: "Nuclear Legislation in Latin America and the Caribbean prepared and is being made available in electronic form.

10. the availability of documents for interchange in the region is directly related to the richness of the collections in the relevant libraries of the participating Information Units. The outlays for subscriptions to periodic scientific publications made by these libraries for the biennium was of US$7.342.100

Seen in the light of the above 10 points, it can be seen that a working electronic network has been established in the region and that the principal objective of sharing nuclear information through computer and telecommunication technology has been achieved.

Finally, it should be noted that the agency's contribution, budgeted for the project, was US$358.000. As of this writing an amount of $311.180 has been spent, representing an execution of 86.9%. The direct contributions of the participating countries to the project were of US$462.828. Further contributions of the participating countries, to be considered as "indirect" contributions, were those mentioned at point 10. above.

EXECUTIVE SUMMARY QUALITY ASSURANCE IN NUCLEAR ANALYTICAL LABORATORIES ARCAL XXVI-RLA/4/013 1997-2001

The introduction and implementation of quality assurance schemes in analytical laboratories has become a necessity in an ever-increasing globalized environment to facilitate national and international trade and commerce. It is recognized that the adoption of the requirements of the relevant international standards contributes to achieve a high degree of accuracy and demonstrable reliability in the analytical results required by the client.

With in the frame work of the ARCAL Programme, a regional project for the Latin America and the Caribbean region (ARCAL XXVI, RLA/4/013) was initiated in 1997 with the participation of twelve countries: Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, Mexico, Peru, Uruguay and Venezuela.

The two main objectives of the project were: a) to design a quality assurance programme for the adoption and implementation of the participating laboratories and b) to achieve accreditation by a national competent authority, or recognition by the IAEA of at least one laboratory per country. Following recognized international trends, it was felt that the adoption and implemention of the ISO/IEC 17025: 1999 standard would increase the level of confidence of the clients on the performance of the analytical laboratory as well as its competitiveness and sustainability; therefore, it was this international standard, which was adopted during the implementation of this project.

At the on set of the project in 1997, 78 regional laboratories using nuclear and nuclear related analytical techniques were invited to participate in the project. After a revision of the real possibilities of each laboratory to comply with the requirements of the project, 50 laboratories from 12 countries were selected to participate in the implementation of the project. Among the nuclear techniques included in the scope of the project were Neutron Activation Analysis, X-Ray Fluorescence Analysis, Gamma Spectrometry for radionuclide determinations, Atomic Adsorption Spectrometry and Inductively Coupled Plasma. The matrices of interest were of environmental and geological interest such as: water, minerals, soils, sediments and milk powder. After a period of participation, due to several reasons, 16 laboratories decided to withdrawn from the project, so that at the end of 1999, 34 remained active.

During the four years of the project, 25 national and regional workshops were organized, and 742 persons were trained on advanced and modern aspects of the ISO/IEC 17025:1999 including its previous documents. This training was essential to elaborate the quality manuals for each laboratory and the respective technical and quality procedures, design and implement the respective quality systems and qualify the staff on conducting internal auditing exercises. Regional experts took active part in these training events with the collaboration of international experts.

All 34 laboratories, which have participated in the proficiency test conducted at the end of 2000, have demonstrated a very good analytical performance. Moreover, 22 of these laboratories (64.7%) also participated in an audit evaluation exercise conducted by regional and international auditors on behalf of the IAEA; the results showed that they have achieved a high degree of implementation of a quality system in accordance with the above international standards.

The mayor achievements of the project, as of December 2000, can be highlighted as follows: all 34 laboratories have prepared specific quality manuals and laboratory procedures to suit their needs and are in advanced stages of implementation of a modern quality system in accordance to ISO/IEC 17025:199. In fact, at the end of 2000, 5 laboratories (1 in Chile, 3 in Cuba and 1 in Mexico) representing 14.7 % of the participating laboratories, have reached accreditation with the corresponding national accreditation authority. 12 more, representing 35.3 % of the participating laboratories, are expected to reach national accreditation at the beginning of 2001 and receive the letter of recognition by the Agency as well. The remaining 17 laboratories, with the exception of perhaps 2, are expected to reach the same level some time in 2001.

An active network based on the use of electronic communication was established among the 34 laboratories, which has allowed fast and effective sharing of experience and information. An effective network of communication would foster the development and standardisation of the terminology and laboratory procedures, which would facilitate comparison of analytical data on a more reliable manner and ultimately, would facilitate commercial trade in the region.

It is also important to emphasize that the laboratories, which at the beginning of the project had only an elemental quality system, have now well established quality assurance schemes in accordance with international standards. Many of the technical staff in the region is currently providing expert advice to other national laboratories in the introduction and implementation of quality systems.

It can be concluded that the project will achieve fully the expected results before the end of 2001. It is expected that 32 laboratories, which represents 94.1.2 % of the 34 laboratories participating in the last phase of the project, will receive national accreditation and the letter of recognition from the IAEA before the end of 2001.

Only recently (middle of August 2001), the Neutron Activation Laboratory of the Atomic Energy Commission of Argentina has received full national accreditation, which together with a similar laboratory of the Atomic Energy Commission of Chile, make two the neutron activation laboratories accredited in the region of Latin America. It is worth noting that there are only a handful neutron activation laboratories in the world fully accredited in accordance with ISO/IEC 17025:1999.

To consolidate the achievements of the project as a whole and help the other laboratories to complete totally with all the requirements of ISO/IEC 17025, 1999, a second Proficiency Test (PT) and a second round of external auditing to those laboratories which will seek national accreditation are scheduled for 2001. A related potential new regional project is under discussion with the main objective of increasing the regional expertise in auditing nuclear analytical laboratories and facilitating the dialogue and understanding of the nuclear techniques by the national accreditation bodies, which usually do not have expertise in the nuclear field.

The participating laboratories, in addition to having a well implemented quality systems, do have a good number of highly qualified staff to maintain the system and are prepared to provide high quality analytical services to internal as well as external clients, who in turn should also be better prepared to meet the challenges of the globalization of trade and commerce.

An ARCAL project implemented with the support of the Departments of Technical Co-operation and Nuclear Science and Applications

Vienna, 2001-09-16

ANNEX 6 (c)

RCA SUCCESS STORIES
REGIONAL COOPERATIVE AGREEMENT
(RCA)

Health Care Programme

(Presented at the RCA-ARCAL-AFRA Tripartite Meeting, Vienna 16 September 2001

1. Introduction

Since 1996 the activities of the RCA have been gradually structured into several thematic program areas, which are currently classified as follows:

- Agriculture
- Health Care
- Industry
- Natural Resources and Environment
- Energy, Research Reactor and Waste Management
- Radiation Protection

The Activities in each of those thematic program areas are designed capture opportunities and to address the needs of the region as well as those of the Member States. The fact that the technology status of the RCA Member States ranges from less developing al lthe way to highly advance offers interesting challenges and great opportunities at the same time. In view of this, areas of priorities and types of activities of the RCA projects are selected and oriented to give maximum benefits to the Member States. Efforts are made to strengthen technical collaboration among developing countries (TCDC) as well as between the developing and technologically advanced Member States.

Depending upon the needs of the participating Member States, the essential components of the projects activities, namely:

- Application of specific nuclear techniques/to solve specific problems encountered by the Member States;
- Capacity Building: Human Resources Development, Maintenance and Improvement of Scientific facilities, as well as Science and Technology Managment;
- Appropriate R&D to support problem solving activities (aimed at improving effectiveness and efficiency);
- Public Awareness campaign, aimed at achieving greater public appreciation and public support

are carefully balanced in each project, as to give maximum benefits to the end users in the respective Member States.

2. Program Strategy

So far, Health Care enjoys in the RCA programme the second highest priority after the Agriculture. The areas of priorities as well as major topics and activities of regional interest are determined in the first stage at the Advisory Group Meetings, which are normally attended by representatives,

consisting of senior officials from the Health Ministries and Nuclear Research Institutes in the participating Member States. Project proposals are subsequently developed by Project Committees under the management of the Lead Country Co-ordinators in collaboration with the National Project Co-ordinators of the participating Member States, assisted on the Agency side by the Technical Officer and the RCA Co-ordinator. The project proposal were submitted to the Agency after approval by the Meeting of the RCA National Representatives.

The Application of nuclear techniques in the Health Care Sector in the developing countries are generally faced with many kinds of difficulties and problems. Chief among these may be classified as follows:

a. **Awareness**: Inadequate awareness and appreciation of the health authorities, health care practitioners and the public on the benefits of nuclear techniques in providing cost effective solutions to certain health care problems.

b. **Facilities**: Inadequate number of facilities to enable effective and efficient application of nuclear techniques solving health care problems. This condition generally results from the inadequacy of funds and expertise for the acquisition, operation, maintenance and utilization the required tools, instruments and facilities.

c. **Expertise**: Inadequate number of component and dedicated personnel to operate, maintain and utilize the available/existing tools, instruments and facilities.

Recognizing the afore-mentioned problems, the RCA program of activities are generally designed to assist the Member States to:

- disseminate **information** on the benefits, and in certain cases the unique role, of nuclear techniques in solving certain areas in health care problems cost effectively.

- develop and strengthen the required **human resources**, necessary for the operation, maintenance and utilization of the existing facilities, and in an effort to acquire or develop new ones.

- develop and implement common strategies and methodologies, including Quality Assurance and Quality Control **(QA-QC)**, to ensure high quality delivery of health care services by health care personnel using nuclear techniques to the patients.

- acquire and apply the necessary knowledge and practical skill in the **maintenance and repair**, especially in trouble shooting and replacement of (minor) components, as well as in the operation and calibration of the existing nuclear instruments and facilities, in order to ensure correct and optimum utilization.

3. Examples of Recent Achievements

Some examples of the success stories achieved recently in the course of implementing the RCA Programme in Health Care may be summarized as follows.

a. Capacity Building: Facilities and Expertise

Recent success in the activities associated with capacity building has been achieved in the acquisition of knowledge and practical skill in the:

- Application of Scintimamography (Indonesia, Feb. 2000)
- Treatment of liver cancer (Singapore, Feb. 2000)
- Application of Positron Emission Tomography (China, November 2000)
- Myocardial Perfusion Scintigraphy (India, December 2000)
- Cardiac SPECT and Scintimammography Techniques (Bangladesh, December 2000)
- Cardiac SPECT and Scintimammography Techniques (Bangladesh, December 2000)

The activities have resulted in the increase of trained personnel and national awareness in myocardial perfusion scintigraphy, breast cancer diagnosis using scintimammography, post-operative treatment of thyroid cancer and preventive nephropathy, improved diagnostics of heart disease and breast cancer, as well as provision of manuals on myocardial scintigraphy and breast cancer atlas.

b. Quality Assurance (QA)

The activities were aimed at promoting Quality Assurance Practices in the application of nuclear techniques in radiation therapy and radiation processing, in particular through the acquisition of knowledge and skill in the:

- Evidence based radiation Oncology (Singapore, August 2000)
- Physical Aspects of Quality Assurance in Radiotherapy (Australia, November 2000)
- QA in Radiation Sterilization of Tissue Grafts

The activities have given significant improvement of knowledge and skill of the responsible personnel. Upgrading of QA and introduction of new techniques have resulted in fewer treatment-related complications and more diseases treated effectively (brachytherapy). In the case of tissue grafts, public confidence has been significantly increased in the used of radiation sterilized tissue grafts. <AD>

Improvement of Research reactor operation and utilization

(RCA)

Research Reactor Status

- 40 RRs and many critical assemblies in 12 RCA MSs
- Majority in operation, some shut down for decommissioning or due to problem
- 3 new RR projects, a few new ones in consideration

Previous Activities by IAEA

- 11 RTCs & Workshops, 1 CRP during 1990-1996
- 1 CRP during 1995-1999, 1 new CRP from 2000

➜ *Training of scientists and engineers
* Encourage in the use of neutron beams
* Application of PCs for RRs
* Successful commissioning and operation of new research reactors in Indonesia and Korea

Thematic Programme

- Major problem: Utilization of some of RRs is much below the expected level, due to

1) Lack of information exchange
2) Ageing of RRs, Obsolescence of facilities and components
3) Lack of modern experimental facilities & instrumentation for their utilization
4) Shortage of trained manpower
5) Limitation of utilization due to design feature of the reactor or operating only one reactor
6) Extended reactor outage due to equipment/component break-down

- 1999-2000: Operational safety and ageing management

1) RTCs: Safety in operation and utilization

Thermal-hydraulic analysis

2) Seminar: Ageing management

➜ Long term impact is expected
* Insight into experience of others
* Interaction with several professionals in the field of interest
* Practical increase in expertise
* Application of acquainted knowledge for analyses of reactor refurbishment or design of new reactors, and reactor operation
* More confident and capable to do the task themselves
* Sharing of methodologies, potential problems and solutions

3) Close link with other regional activities in RR

- FNCA: Utilization of research reactor, Safety culture
- IAEA EBP: Research reactor safety

4) Enhanced communication

- Communication link among the project committee by e-mail
- IAEA research reactor list-server

➜ Better information exchange

- 2001-2002: Balance with previous cycle

1) Expert's meeting: Sharing of RR resources

* Basic agreement to open each RR resources
* Communication network in each utilization field
* Utilize regional workshops for realization of sharing

2) Workshops: Neutron beam application

Reactor core management
Strategic planning of RRs

3) RTCs: D&D

In-service inspection

2003-2004: Balance with previous cycles

4 Workshops:

RI production and utilization
Experimental RR physics
Management of safety
I&C

➜ Improve utilization
Improve operation for aged reactors
Better planning of new reactors

_ 3 new reactors in the near future

Australia, China, Thailand

_ New reactors under consideration

Korea, Myanmar, Philippines, Vietnam

_ Restoration to operation

Philippine

_ Upgrade

India: a RR & a critical assembly

Improvement of research reactor operation and utilization (RCA)

There are 40 research reactors and many critical assemblies in the twelve RCA Member States. Majority of them are in operation but some of them are shut down for decommissioning or due to problem. Since many of operating reactors are rather aged, several countries intend to have new ones. There are three new research reactor projects on going and a few countries are considering new ones.

During 1990 - 1996, the IAEA conducted 11 training courses and workshops and 1 CRP through RCA research reactor projects. The courses and workshops were very useful in terms of training of scientists and engineers, as well as in the acquaintance of reactor operators with the commercial application of research reactors such as silicon doping and neutron radiography. Member States were encouraged through these activities in the use of neutron beams. This has also provided the awareness about the programs, capabilities, problems and local strategies to resolve the issues of the individual Member States. The CRP on "Use of Personal Computers to Enhance Operation and Management of Research Reactors" has encouraged the application of personal computers for the data acquisition and reactor management. The activities also contributed for the successful commissioning and operation of new research reactors during this period in Indonesia and Korea.

From 1995 until 1999, the Agency conducted a CRP on "Analysis of Research Reactor Transients". A number of RCA Member States participated in this international CRP. A new CRP on Small Angle Neutron Scattering (SANS) is underway from 2000. This CRP directly addresses further issues identified by the regional Member States.

The thematic program entitled “Improvement of research reactor operation and utilization” was made in 1998 and Korea has been leading the project. The first two years activities of 1999 and 2000 period were successfully implemented and the Project Committee evaluated them excellent. The second period project of 2001 and 2002 is under implementation and the proposal for the third period of 2003 and 2004 was submitted for approval.

At the project formulation meeting, it was brought out that several facilities in the region are available, but the utilization of some of them is much below the expected level. Its reasons were identified as 1) lack of information exchange, 2) ageing of research reactors, 3) obsolescence of facilities and components, 4) lack of modern experimental facilities and instrumentation for their utilization, 5) shortage of trained manpower, 6) limitation of utilization due to design feature of the reactor or operating only one reactor, 7) extended reactor outage due to equipment/component break-down.

During 1999 and 2000 period, focus were given to operational safety and ageing management. The balance work and some additional items which could not be included in this period were scheduled for the period 2001/2002. The regional training courses on “Safety in operation and utilization” and “Thermal-hydraulic analysis” and a seminar on “Ageing management” were successfully implemented and all project coordinators expressed that they were very valuable. The impact of training courses and the seminar will be long term and cannot be seen immediately. The significant benefit of gaining insight into the experience of others and the opportunity for interaction with several professionals in the field of interest are some of the significant benefits that should not be overlooked.

Training courses have provided significant benefit in terms of practical increase in expertise as applied to research reactors. Participants have been applying acquainted knowledge for analyses of their reactor refurbishment or design of new reactors as well as their reactor operation. The concerned staff also feel more confident and are capable to do the task themselves now.

The seminar was of a high quality and was very helpful for sharing of methodologies, potential problems and solutions. It was observed that not only the research reactor personnel of old reactors but also those operating comparatively new facilities are concerned about ageing effects and are monitoring plant data carefully to identify any significant ageing effects. It was also brought out that while refurbishment of old reactors may require considerable period of time, it would he highly cost-effective since refurbishing costs would be only 1 – 5% of the cost of building a new reactor of similar design. Overall, the seminar provided a good forum for information exchange on this important topic and helped in enhancing awareness about ageing management of research reactors.

The Project Committee agreed to keep close link with other international cooperation projects in research reactor such as “Utilization of research reactor” and “Safety culture” under FNCA(Forum for Nuclear Cooperation in Asia) frame work and “Research reactor safety” by the IAEA EBP(Extra-budgetary Program). The communication link among the project committee utilizing the modern communication system of e-mail and the list-server for research reactor operated by the Agency from 1999 has fulfilled the request of the region for the better information exchange among research reactor operators.

The first activity of the 2001 and 2002 period was an expert’s meeting on “Sharing of research reactor resources”. All participated project coordinators expressed their willingness to open their research reactor resources for their use from other Member States. Communication network in each research reactor utilization field was established and they are talking for the actual implementation of resource sharing. The workshops not only by this project but also by other international cooperation activities in the region will be utilized as chances for discussions on resource sharing. As an example, at the workshop on “Neutron beam application” which will be held in HANARO, Korea, soon, intense discussion on the sharing of neutron beam facilities in the region among responsible persons is scheduled.

Other activities scheduled in this period are regional workshops on “Reactor core management” and “Strategic planning of research reactor”, and regional training courses on “Decommissioning and decontamination” and “In-service inspection”.

The Project Committee strongly wanted continuation of this project to 2003 and 2004 period. Four regional workshops were selected among areas identified as needing further technical co-operation. They are “RI production and supply”, “Management of safety”, “Instrumentation and control” and “Experimental research reactor physics”. These are considered to be important for improving utilization and practical aspects of improvement of operation for aged reactors and for planning of new reactors.

It is expected that several new reactors will be built in this region in the near future including Australia, China and Thailand. Korea, Myanmar, Philippines and Vietnam are also considering new research reactors. The existing Philippine reactor will be restored to operation in the next few years. Furthermore, major upgrades will be made to an existing pool-type reactor and a new critical facility will be built in India. This situation was considered for the selection of topics in the next period.