Progress and Perspective of FNCA

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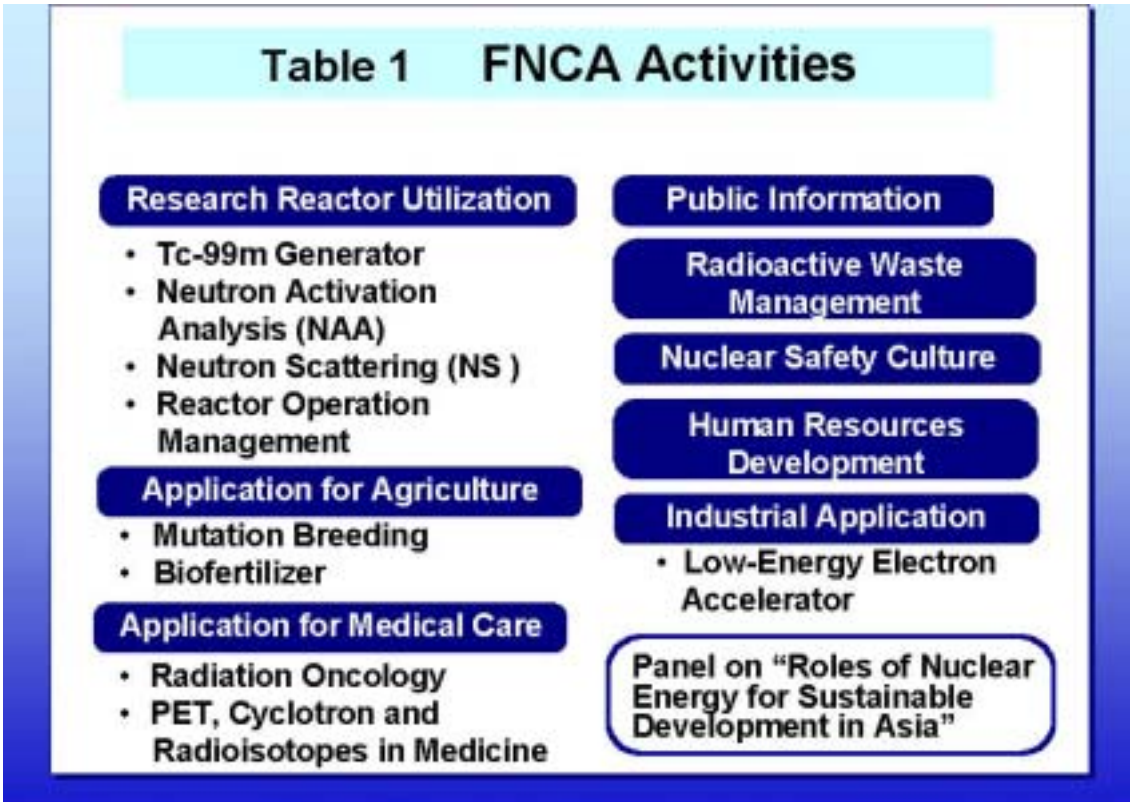
Introduction

FNCA is implementing activities of 13 projects and sub-projects as well as one panel as shown in the Table 1. This report highlights the recent achievements of these activities.



1. Projects for Research and Development

(1) Application of Research Reactor

There are 4 sub-projects aiming enhancement of research reactor application as shown in Table 2, since the reactor is major tool for most of nuclear research institutes.

Table 2 Research Reactor Application

1. Neutron Activation Analysis for Environmental Monitoring
   Phase 2: Application for environmental protection planning
2. Tc-99m Generator Production for Nuclear Medicine
   Phase 2: Commercial applications
3. Neutron Scattering for Material Science
4. Improvement of Reactor Operation Management (New)

1) Neutron Activation Analysis (NAA) for Monitoring Airborne Particulates

The particulates samples were collected in each country using common filters provided by Japan, in urban and rural areas, and analyzed by the NAA. The monitoring are being continued in each country and the compiled report will be published in late 2004. "Ko- method", which improves efficiency of NAA to be affordable in measurement of large number of environmental samples is being developed by the collaboration with IAEA.

Sample collection of airborne particulates in Japan

Future plan:

1) Results of NAA measurements of airborne particulates should be used for the planning of environmental control. In this respect the coordination with ministry responsible for environmental control should be strengthened.

2) The new proposal of Viet Nam to monitor pollution of sea water and sediment in coast area is being implemented by the measurement of sediment and/or biota using NAA.

2) Tc-99m Generator

The project on "Tc-99m Generator" using Mo-99 produced by (n, γ) reaction and Poly-Zirconium Compound (PZC) adsorbent have remarkable progress in design of production system by collaboration of Japan and Indonesia. The demonstration of manual production was made in BATAN at the Workshop in 2003. A remote operated plant for loading Mo-99 adsorbed on PZC has been installed at the laboratory of BATAN, Indonesia in December 2003 (Photo 1). The demonstration of the plant operation was performed during the Workshop in January 2004. Quality assurance test of the Mo-PZC loaded column has been achieved in Indonesia in 2004. The BATAN-Kaken Joint Patent on the PZC based Tc-99m generator and Mo-99 loading machine has been already applied in Japan (Oct. 31, 2002) and Indonesia (Feb. 24, 2003) for registration.

Photo 1
Automatic loading machine for Mo-99 adsorbed PZC installed at the hot laboratory of BATAN

Future plan:

1) Loading plant installation in other FNCA countries with the technical support of Japan and Indonesia in 2005.

(2) Low Energy Electron Accelerators Application

Electron accelerator is very useful for production of value added polymeric materials. The 3rd Workshop on “Application of Low Energy Electron Accelerators” was held at Kuala Lumpur, Malaysia, where the demonstration for thin film irradiation was achieved in 2003. Demonstration of flue gas treatment in China in 2004. The Cost analysis of the low energy electron process is in progress.

Future Plan

1) Cost evaluation of radiation processing of liquid, solid, and gas by low energy electron accelerator

2) Focusing on specific application to meet market demand in each country.

Photo 2
Electron accelerator in MINT, Malaysia

Photo 3
Demonstration to prepare thin film to be irradiated

(3) Application for More Productive Agriculture

1) Mutation Breeding by Radiation

The project on "Mutation Breeding" has started a specific activity to develop new varieties of the drought-tolerant sorghum and soybean in 2002 being joined by China, Indonesia, the Philippines and Viet Nam. Better mutant of sorghum has been developed in Indonesia (Photo 4). Another target is the mutation breeding of insect-resistant orchid started in 2003 by participation of Thailand, Malaysia and Indonesia. Mutants of soybean, sorghum and orchid have been exchanged between the participating countries (Photo 5). Malaysia and Indonesia newly joined "soybean" activity in 2003.

Mutation breeding for disease resistant banana also started by Indonesia, Malaysia, the Philippines and Viet Nam in 2004

Photo 4 Mutant sorghum (Indonesia)

Photo 5 Exchange of mutants of orchid at the Workshop in 2003

Future plan:

1) Selection of better mutant varieties of sorghum, soybean, orchid and banana will be continued and intermediate results will be reviewed in 2005.

2) In order to increase kinds of mutant, the utilization of the ion accelerator of JAERI will be facilitated by the FNCA Coordinator of Japan responding the specific request of FNCA countries.

2) Biofertilizer

Biofertilizer is effective in increasing yields by using specific micro-organism, such as Rhizobia and Micorrhizal Fungi. The 1st Workshop has formulated the work plan in 2002 and 2003 including the field demonstration in participating countries to show impacts of the biofertilizer. The 2nd Workshop in Viet Nam was jointly organized with JSPS Research Project of Biofertilizer with participation of the IAEA expert. Field demonstration of biofertilizer (Rhizobia) for peanuts in Viet Nam was successful as shown in Photo 6. The strategy for effective extension of biofertilizer was formulated by each country to be implemented.

Future plan:

1) Strategic demonstration of biofertilizer application in less-fertile soil in 2004 and 2005

2) Pilot production of biofertilizer using radiation sterilization of carriers in 2004 and 2005

Photo 6

Peanuts with biofertilizer (Viet Nam 2003)

Peanuts without biofertilizer (Viet Nam 2003)

(4) Application for Medical Care

1) Radiation Oncology

The project on the radiation therapy of uterine cervix cancer has achieved remarkable progress in 210 clinical tests using the FNCA advanced protocol in participating countries as shown in Photo 7. Survival rate for the stage III-B patients at 5 years after treatment is 52.5% and the local control rate of tumor is 81.5%, which show remarkable improvement. The guidebook on the treatment

protocol "CERVIX-I" has been published in 2002 for therapists. In conjunction with the FNCA Workshop, the Open Lecture on "Radiation Therapy" were presented for 150 audiences in 2003 in Tokyo. Clinical test of treatment of uterine cervix cancer by combination of chemotherapy and radiation therapy was started in 2003 and implemented in 2004.

Activities on the improvement of QA/QC of radiation therapy is in progress.

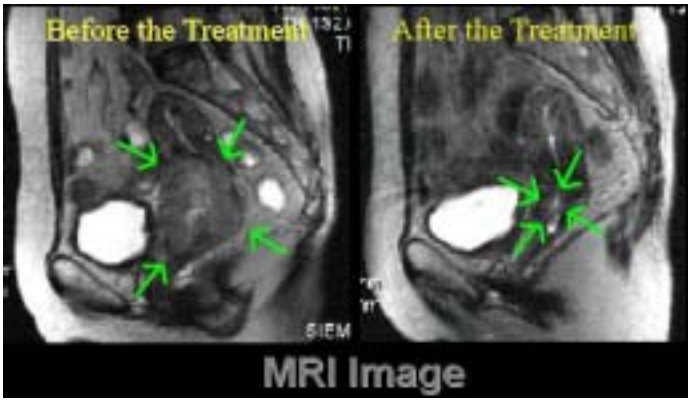


Photo 7
Radiation therapy of
uterine cervix cancer using
FNCA protocol

Future plan:

a) The clinical test of the uterine cervix cancer treatment by radiation combined with chemotherapy will be fully implemented in 2004 and 2005.

b) The radiation combined with chemotherapy of head and neck cancer also will be preliminarily studied in 2004 and 2005.

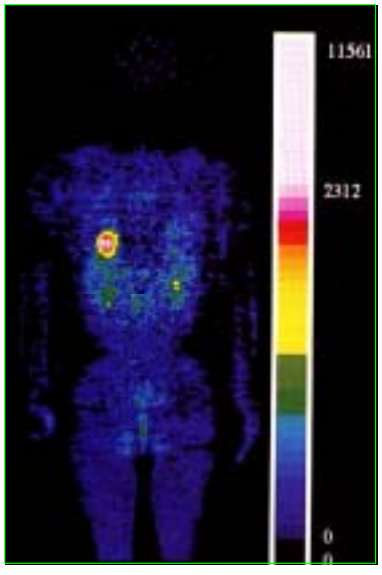
2) Positron Emission Tomography (PET) for Early Diagnosis of Cancer (New)

This project will be started in 2005 by the initiative of Malaysian government. The PET is an advanced nuclear medicine to make early stage diagnosis of cancer (Photo 8).

The purpose of the project is summarized as follows:

- Information exchange on cyclotron, PET camera, image reading, FDG preparation
- R&D cooperation on PET diagnosis
- Promotion of PET

The first workshop will be held in 2005 in Malaysia.



(5) Radioactive Waste Management (RWM)

The Task Group on "Spent Radiation Source Management"(SRSM) had useful visits to relevant facilities to have fruitful discussion in Indonesia and Korea in 2002. The report of this SRSM Task Group was published in March 2003. The Task Group of "TENORM" (Technologically Enhanced Naturally Occurring Radioactive Materials) visited Viet Nam, Thailand, China, Malaysia, and Australia to assess the safety and management of TENORM in 2003 to make useful recommendations in each country.

Future plan:

a) Task Group of TENORM will visit the Philippines and Indonesia in 2005.

b) The final report of TENORM Task Group will be published in 2005.

2. Policy and Management Related Projects

(1) Human Resources Development (HRD)

The importance of HRD was stressed at the 3rd FNCA Ministerial Level Meeting. The survey of data on HRD such as, available human resources and the demand to meet national program are being carried out in each FNCA country, which should be used to formulate a national strategy of HRD and planning of the HRD project. The matter of regional networking for research, high education and training and potential roles of FNCA are being studied. The development of the common training materials for radiation protection and introduction of e-learning system are being progressed.

Future plan:

1) National HRD strategy should be drafted as case studies to be discussed at the HRD Workshop in 2005

2) The FNCA approach to ANENT of IAEA should be examined

(2) Nuclear Safety Culture (NSC)

Photo 10 Peer review team at Da Lat research reactor, Viet Nam

The self-assessment of research reactors has been conducted in each FNCA country in order to identify the areas for further improvement in fostering safety culture and management. The first peer review of safety culture for research reactor was carried out successfully in Viet Nam on the research reactor of Dalat Nuclear Research Institute in January 2003. Some useful comments and information were presented for Vietnam Atomic Energy Commission (VAEC) to take into account for the improvement of safety culture. Peer review of HANARO (High-flux Advanced Neutron Application Reactor of KAERI) safety culture was implemented in 2004.

Future plan:

1) Self-assessment of safety culture of research reactor in each FNCA country in accordance with IAEA Codes of Conduct.
2) Review of the project outcome in the past years.

(3) Public Information (PI) for Nuclear Energy and Applications

In this project the joint survey on "Radiation" were carried out for 1,100 high school students in each of the seven participating countries. The results are to be used for improving of PI activities.

Three speakers were sent to the ICN'02 in Malaysia and one speaker to the NuTech 03 in Thailand from the FNCA Regional Speakers Bureau Activity in 2002 and 2003.

In conjunction with Project Leaders Meeting in Viet Nam in 2003, two Open Seminars were successfully held on "Public Information Study for Nuclear Energy" in Hanoi and "Radiation Technology Application for Industry in Viet Nam" for about 200 participants. The interview of the FNCA Coordinator of Japan by Viet Nam TV was on the air (Photo 11)

In 2004 the FNCA Workshop for training for nuclear communicator was held in Thailand. FNCA PI Project Leaders from the Philippines and Viet Nam were invited to WIN (Women In Nuclear) Global Annual Meeting in Tokyo in 2004. They gave presentation on the PI activities in their countries.

Photo 11
Interview of FNCA Coordinator of Japan by the Viet Nam TV in Ha Noi, Project Leaders Meeting in 2003

Future plan:

a) Activities to enhance communication with media will be organized in each country where the FNCA will provide necessary experts.

b) Training nuclear communicators will be continued in 2005.

(4) Panel on "Role of Nuclear Energy for Sustainable Development in Asia"

The first meeting of the Panel was held in October 2004 with the participation of experts of energy policy and nuclear power from 8 countries. After 2 full day discussion, the meeting agreed to take note following major points of energy policy.

1. The national energy demand-supply strategy to be formulated in line with the policy of energy security.
2. Possible countermeasures for the shortage of fossil fuel reserve and increasing energy demand are:
   1) further exploration of fossil fuels,
   2) energy conservation and improving energy efficiency,
   3) development of renewable energy,
   4) diversification of energy sources, and
   5) enhancement of the use of nuclear power.
3. Nuclear power can play a key role for securing energy supply and environmental protection. More effort should be put to enhance the pubic education and information for the improvement of public acceptance of nuclear power in the light of safety assurance, risk and benefits.

The 2nd Panel Meeting will be held in autumn of 2005 in Japan following the Work Plan focusing on the energy demand-supply plan, countermeasures for limited amount of fossil fuels, and energy security, environmental impact and potential role of nuclear energy.