FNCA Newsletter

Forum for Nuclear Cooperation in Asia

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The Sixth Meeting of the Forum for Nuclear Cooperation in Asia (FNCA)

Mr.Matsuda

I hope that the outcome of this meeting will contribute to promoting nuclear technology in every participating country on the fundamental premise of ensuring safety and public acceptance, and will eventually contribute to socioeconomic development.

From Left: Mr. Seok-Sik Choi (Korea), Dr. Hudi Hastowo (Indonesia), Dr. Manoon Aramrattana (Thailand), H.E. Dr. Le Dinh Tien (Viet Nam), H.E. Mr. Iwao Matsuda (Japan), The Hon.Y. B. Dato' Sri Dr. Jamaludin Bin Mohd Jarjis (Malaysia), The Hon. Dr. Estrella Fagela Alabastro (Philippines), H.E. Mr. Sun Qin (China), H.E. Dr. Abdul Moyeen Khan (Bangladesh), Dr. Ian Oswald Smith (Australia)

The Ministerial-level Meeting of the Sixth Forum for Nuclear Cooperation in Asia (FNCA) was held on December 1st, 2005 in Tokyo under the chairmanship of Professor Shunsuke Kondo, Chairman of the Atomic Energy Commission of Japan. Ministers presented were those who had jurisdiction over the research, development and utilization of nuclear energy for peaceful purposes from nine countries: Australia, China, Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Thailand and Viet Nam. Bangladesh was recognized as observer at the outset of the Opening session of the meeting and the Minister from Bangladesh was present at the meeting.

At the Country Report Session, each Minister made a report of the current status of FNCA activities and the trends in policy measures related to the recent research, development and utilization of nuclear energy in their country. As for fields of application of radiation, it was reported that positive and fruitful results are being steadily attained in each country and contributions are being made to improving the quality of life of the people and socio-economic development, and was also confirmed that FNCA activities played a major role in such developments. It was reconfirmed also that the role of nuclear energy is significant from the perspectives of the efforts for ensuring the stable supply of energy as well as dealing with the global warming problem. The participating countries have welcome the development of FNCA activities over these past few years for the promotion of the peaceful use of nuclear energy in the Asian region and stressed the importance of promoting cooperation to magnify the socio-economic development to an even greater extent among all of the FNCA countries.

FNCA Project WS in 2005

Field	Projects	Highlight	Workshop/PLM
Research Reactor Utilization	Tc-99m Generator	Work plan for the routine production of PZC-based Tc-99m generator, Improvement of Mo-99 loading machine	08/2005 Malaysia
	Neutron Activation Analysis	Intercomparison of NAA data for SPM and survey of progress for the new phase in each participating country	
	Research Reactor Technology	Installation of common code SRAC for core management in each participating country Distribution of high performance Monte Carlo code (MVP) from Japan	
Application for Agriculture	Mutation Breeding	Drought tolerance in sorghum and soybean, Insect resistance in orchids, Disease resistance in bananas	12/2005 Malaysia
	Biofertilizer	Field demonstration, Economic analysis, Sterilization of career by irradiation	01/2006 Philippines
Application for Medical Care	Radiation Oncology	The results of the clinical study for Cervix Cancer with Accelerated Hyper-fractionation Radiotherapy indicated the 5 year survival rate was 73%. Three new protocols for advanced cancer with Chemo-radiotherapy under study.	01/2006 Korea
	Cyclotron and PET in Medicine	The 1st Workshop of PET application in medicine will be held in 2006. Action plan consisted of three aspects for Diagnosis, Pharmaceuticals and Instrumentation.	–
Public Information		The FNCA Symposium on Public Information and Activities in Seven FNCA Countries proved to be a success.	09/2005 Japan
Radioactive Waste Management		Safety assessment, site investigation and siting procedures of disposal facility for LILW discussed.	09-10/2005 Japan
Nuclear Safety Culture		Safety culture peer review of KARTINI Research Reactor conducted	06/2005 Indonesia
Human Resources Development		"Asian Nuclear Training and Education Program (ANTEP)" plan agreed.	09/2005 Viet Nam
Industrial Application	Low Energy Electron Accelerator	Review of low energy electron beam (EB) system for wastewater treatment	11/2005 Korea

PLM: Project Leaders Meeting

Major Achievements of Ongoing Projects in 2005

Research Reactor Utilization

Tc-99m Generator

Technetium-99m Generator for Diagnosis in Nuclear Medicine

- Aiming for the dissemination of environmentally friendly production technology -

Technetium-99m (^{99m}Tc) is the most widely used radioisotopes for diagnostic radiopharmaceuticals in nuclear medicine and seems to remain in this position for the foreseeable future.

Major method of producing ^{99}Mo, the parent of ^{99m}Tc, is from the fission of ^{235}U using highly enriched uranium providing very high specific activity. However, the processing of the irradiated uranium target is responsible for the generation of significant amounts of gaseous, liquid and solid radioactive wastes. Accordingly the fission-produced ^{99}Mo demands expensive facilities and extreme care to avoid contamination with fission products.

Another method of producing ^{99}Mo is the irradiation of natural molybdenum in research reactors. In the case of neutron activation, the requirement for post-irradiation processing is minimal and only small quantities of radioactive waste are produced. The disadvantage of neutron-activation-produced ^{99}Mo is its very low specific activity.

An inorganic polymer framed with oxygen-zirconium-chlorine bonds was developed by joint research of JAEA and Techne Generator Inc. and this inorganic material was named PZC (Poly-Zirconium Compound). The adsorption capacity of PZC for molybdenum is around 300 mg(Mo)/g(PZC) or more while that of conventional adsorbent is typically 2 mg(Mo) in 1g of Alumina. New adsorbent material was registered as the U.S. Patent and the Japanese Patent. Furthermore application of patents for Tc-99m generator assembly using PZC and remote controlled loading machine for preparing PZC column of the generator were made in Japan and Indonesia.

Using the PZC, an efficient and low cost ^{99m}Tc generator loaded with ^{99}Mo produced by neutron irradiation of natural molybdenum has been developed under the framework of the FNCA since 2002. The characteristics of new generator were proven to be better than the conventional fission-based generator in terms of elution profile and elution yield of ^{99m}Tc and the breakthrough of ^{99}Mo. Presently the clinical trials are being carried out in hospitals.

Significant social benefits with the stable supply of radioisotopes for cancer diagnosis can be expected, and the local production of new type generators will cause economic effects to save foreign currency. In the long run, this project could facilitate the regional network for

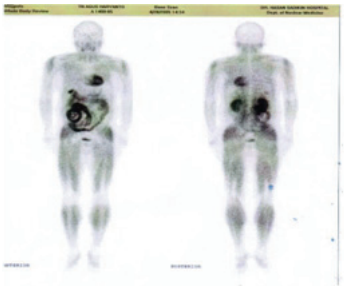


Fig. 1 Whole body review

Fig.2 Dual head SPECT machine

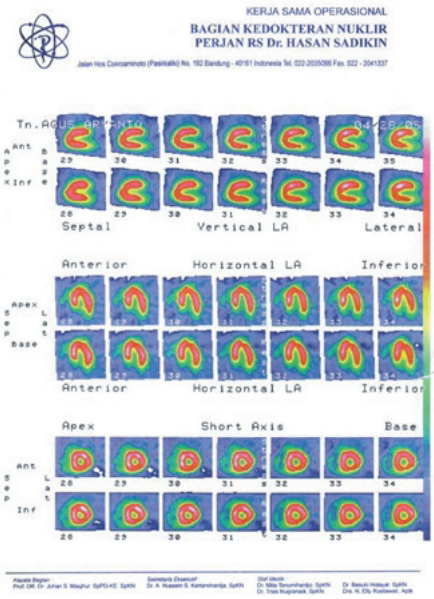


Fig. 3 Heart diagnosis with SPECT

^{99m}Tc supply among the FNCA countries.

The picture shown in Fig.1 is the γ-camera image of the whole body review taken with pertechnetate obtained from the PZC-based ^{99m}Tc generator. The clinical trial of myocardial perfusion imaging agent prepared as MIBI radiopharmaceutical kit labeled with ^{99m}Tc was also very satisfactory.

The SPECT (Fig.2 Single Photon Emission Computer Tomography) patterns of "stress" condition (upper line) and "rest" condition (lower line) show the sound state of the heart and also the good quality of ^{99m}Tc-MIBI since both patterns are not much different from each other (Fig.3).

Neutron Activation Analysis

A main objective of the project is an application of neutron activation analysis (hereafter, NAA) to environmental samples for monitoring the environmental pollution level. The environmental samples cover the suspended particulate matter (SPM), marine sediment, marine biota, etc. Being different from the case for the previous phase of NAA project, where a common substance (SPM) was assigned, each country chooses its own target for monitoring the environment. To achieve this objective, there are several practical objectives (i) collection of individual environmental samples in each country, (ii) analysis of the samples by NAA, (iii) evaluation of the pollution level based on NAA data, (iv) presentation of NAA data to environmental protection people for advising them to set up the environmental protection policy. The last point is the most important and ultimate objective for the NAA group.

An example of the achievements of this project is the intercomparison of NAA data for SPM in FNCA countries (Fig. 4). Sampling of SPM to be analyzed by NAA has been continued from 2001 in major cities of FNCA countries. The IAEA-k_0 method was introduced as a common tool of the project. In order to maintain consistency in analysis, k_0-standardization was implemented among participating countries.

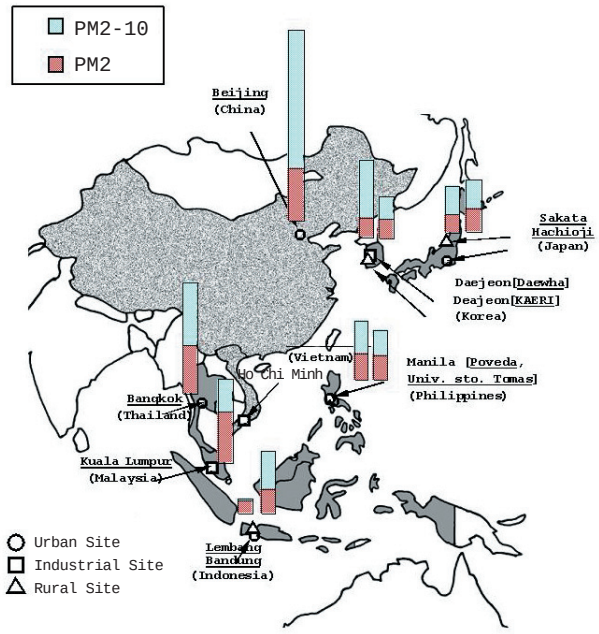


Fig. 4 Intercomparison of suspended particulate matter (SPM) among FNCA countries in terms of particultate size.

Research Reactor Technology

Project Review FY2005

The objectives of the 1st workshop were to share the information on current status of neutronics calculation method used by the participating countries and the status of installation of a common code (SRAC), and to demonstrate how to install and execute the common code.

★ Achievement in the 1st workshop

The objectives of the 1st workshop were achieved well as follows.

1. The first workshop was held successfully with participants from China, Indonesia, Korea, Japan, Malaysia, Thailand and Viet Nam in August 2005 in Kuala Lumpur, Malaysia.
2. The participants exchanged information on current status of neutronics calculation method in each country.
3. Japan, as leading country for the RRT-project, has demonstrated how to install and execute SRAC.
4. All participants were convinced that this project would strongly support safe and stable operations as well as

The first Workshop in Kuala Lumpur

advanced utilizations of research reactors.

★Achievement and plan after the 1st workshop

All participants have installed the common code (SRAC) on their own computer successfully and started to run sample data.

Japan, as the leading country, has distributed the high performance Monte Carlo code (MVP) for accurate calculations.

★ Major Plan of Project Activity

- Neutronics calculation for domestic cores using the common codes and understanding of burn-up calculation
- SRAC-manual (COREBN) is under translation, and it will be distributed at the end of June, 2006.
- Application of common codes for fuel management, advanced utilization, modification, etc. of domestic cores if possible.
- Many attractive applications of common codes were proposed by participants.

Application for Agriculture

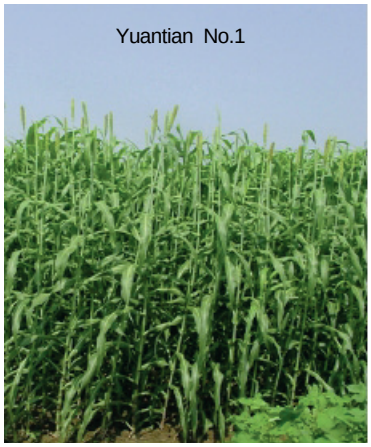
Mutation Breeding

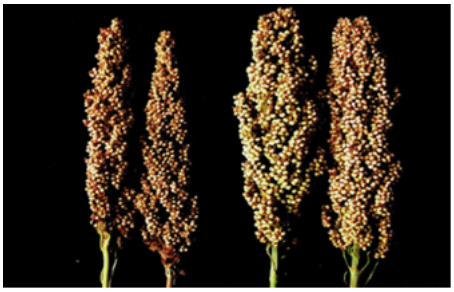
The objectives of this project is the stabilization of food supplies in the Asian region by utilizing mutation breeding to develop new varieties of crops with a high yield, quality and higher resistance to diseases and pests. Export of agricultural products from the new varieties developed by mutation breeding can provide greater economic benefits to the growers. Protection of the environment by reducing use of fungicides and pesticides can also be achieved by this mutation breeding technology. Another purpose of this project is to publicize the usefulness of radiation technology and to promote its wider applications to growers.

This project is now focusing on the following subjects; “Drought Tolerance in Sorghum and Soybean”, “Insect Resistance in Orchids” and “Disease Resistance in Bananas”

For sorghum, participating countries have developed eleven mutant lines exhibiting desirable agronomic traits, good quality and tolerance to drought. These breeding materials have been exchanged between Indonesia and China for additional breeding and selection. In China, sweet sorghum mutant variety “Yuantian 1” was officially released. This should provide significant impacts to local farmers and promote economic growth.

For orchids and bananas, breeding materials and promising lines have been exchanged between participating countries, and now effective screening methods are being developed and promising mutant lines are being screened.





Cont Mutant

Biofertilizer

This project aims to improve and disseminate biofertilizer by applying radiation technology to increase the yields of grain legumes and other crops which are important food and animal feed sources in Asia, and to enhance environmentally friendly sustainable farming practices and save cost by reducing the amount of chemical fertilizer application.

The biofertilizer is the use of microorganisms such as Rhizobia, Mycorrhiza and other microorganisms to increase availability of plant nutrients from air and soil. Microorganisms are kept in the carrier materials such as peat and chicken dung and used as biofertilizer. In order to keep the number of inoculant microorganism on carrier during the storage period before use, the carrier should be sterilized against the occupation by the contaminating and/or native bacteria.

In this project, microorganisms for biofertilizer have

been isolated, their ability of plant growth promotion has been evaluated by utilizing nuclear techniques and the suitable carriers for specific microorganisms have been selected. Then, field tests of their microorganisms for crop growth have been carried out and field trials for farmers have been demonstrated. By the application of biofertilizer, the results of field trials showed that the yield was increased by 30%, the net income of farmers was increased by 80% and the application of chemical fertilizer was reduced by 20-50%.

For extension of biofertilizer application for farmers, the quality assurance and low prices of biofertilizers are important. For that purpose, comparative study on sterilization of carrier by irradiation and heat autoclave is being conducted in terms of work performance, cost performances, quality control and so on.

Without Biofertilizer

Without Biofertilizer With Biofertilizer

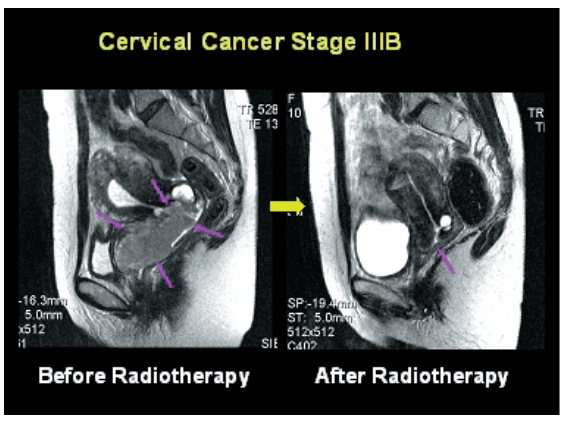
Application for Medical Care

Radiation Oncology

★ Background

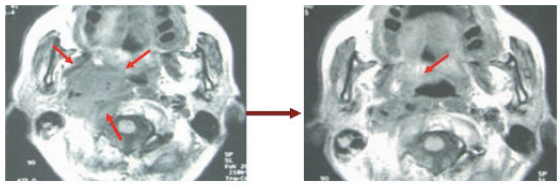
The objective of this project is improvement of human health in Asian countries by establishing and improving standard radiotherapy techniques for prevalent cancers in the region.

Uterine Cervical cancer is one of the most common malignant tumors in Asia. At first, we established a standardized radiotherapy protocol for advanced Uterine Cervical Cancer. The clinical study of this standardized protocol indicated a 5-year overall survival rate of 53%, comparable to results from major centers in developed countries.



★ Highlight of activities

- The result of the 2nd clinical study for Uterine Cervical Cancer with Accelerated Hyper-fractionation Radiotherapy (AHF) indicated 5-year survival and local control rates were 73% and 88% respectively. The outcome of this study is satisfactory.
- As the 3rd clinical study for Uterine Cervical Cancer with Concurrent Chemo-radiotherapy, the number of patients has already reached the planned accrual of 100. This study is now on going, but tumors were well controlled locally. The final analysis of the 5-year survival rate will be evaluated in 2010.
- Nasopharyngeal Cancer (NPC) is also one of the most common malignant tumors in the east and south-east Asia, and two new protocols for advanced NPC with Chemo-radiotherapy are under study. The first one is for advanced nodal stage with concurrent chemo-radiotherapy and adjuvant chemotherapy. The second one is for advanced tumor stage with concurrent chemo-radiotherapy.



NPC before CRT
Invasion to C1

NPC after CRT: CR

- The joint fieldwork of Quality Assurance / Quality Control (QA/QC) for Brachytherapy was conducted at hospitals in 7 countries during 2003-2005 and the results of the measurements were acceptable. A QA/QC activity in a remaining country, China, is being scheduled in 2006.
- A new QA/QC project of postal dose survey for external beam radiotherapy using glass dosimeter will be initiated in 2006 and expected to be completed within 1-2 years.

Cyclotoron and PET in Medicine

★ Background

The Objective of the Project is improvement of diagnostic technique for Nuclear Medicine in Asian countries. Early detection of diseases with advanced technology could contribute to human health betterment in Asia.

Positron Emission Tomography (PET), using of ^{18}F-FDG, is a useful modality in clinical oncology. It is used for diagnosis such as detection of early cancer, staging of the cancer, evaluation of the efficacy of therapy and getting information about recurrence and prognosis. Computed Tomography (CT), using X-ray, shows an image of anatomy, while PET shows an image of physiology and metabolism. A combined PET-CT system in a single setting allows optimal co-registration of data and the fusion of images leading to highly accurate interpretation of images.

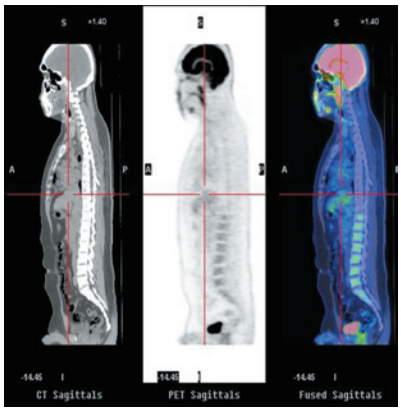


Image of PET/CT


PET/CT Camera

★ Action plan

We will soon start to study about the following three aspects. Their outcome could be educational materials in Asia.

a. Diagnosis Publication of the case review for clinical PET of Asian patients with an internet database system
b. Pharmaceuticals Establishment of Quality Assurance and Quality Control (QA/QC) for PET Pharmaceuticals
c. Instrumentation Establishment of QA/QC for PET camera system

Public Information

The aim of Public Information (PI) Project is to enhance the understanding of nuclear energy and use of radiation among the people in FNCA member countries by means of public communication and outreach. The Strategy of Public Information involves both the Purpose of the Project to be attained and the Technique to be used. These matters were subject to discussion during the FNCA PI Project Leaders Meeting.

★The FNCA 2005 Workshop

The FNCA 2005 Project Leaders Meeting (PLM) on Public Information (PI) of Nuclear Energy was held from September 12 to 15, 2005 in Tokyo and Hachinohe City, Japan. The sessions were conducted extensively to discuss some of the topics covered by the country reports and those relevant to the strategy and the action plans for the next 3-year period. The topics were:

(1) Strategy and technique of public information;
(2) Promotion of public information for RI and radiation application;

Discussion on Special AESJ Session

(3) Public information by FNCA Website and Newsletter;
(4) Effective communications with the mass media personnel; and
(5) Action plans for 3-year 2005-2007

★FNCA Symposium on Public Information Activities

The FNCA PI project has significantly enhanced a range of the PI activities in FNCA member countries. In conjunction with the Public Information Project Leaders (PI/PL) Meetings, we should hold some national nuclear event in the host country. Thus, the FNCA 2005 PI/PL Meeting was held in Tokyo when the Atomic Energy Society of Japan (AESJ) was holding its Fall Meeting in Hachinohe, the Aomori Prefecture on September 13-15, 2005. The Technical Committee of AESJ was kind enough to include in the Technical Program a Special FNCA Session entitled "Public Information Activities of Seven Countries---Views Held by FNCA Public Information Project Leaders regarding the Present Status and Related Issues of Peaceful Use of Nuclear Energy in their Countries."

The audience appeared satisfied because most of them had had no chance to know about the state of affairs in these FNCA countries. The representatives said they were content because by dialogues with the people on the floor they were able to understand where the audience interest would lie and impressed by their friendliness.

Radioactive Waste Management

★FNCA 2005 Workshop at Ningyo-toge in Japan

The FNCA 2005 Workshop was held from September 27 to October 1, 2005 at Kagamino-cho, Okayama, Japan. This Workshop was hosted by MEXT of Japan, in cooperation with the Kagamino Town Office and the Ningyo-Toge Environmental Engineering Center, Japan Atomic Energy Agency (JAEA).

Country reports were presented on progress status of RWM activities in each FNCA country, followed by Poster Session/ Mini-Exhibition. In this Session, the projects and R&D regarding RWM were presented by Japanese participants, and uranium glass products manufactured at Kagamino-cho were displayed by the Kagamino Town Office.

Sub-meetings on "Safety Assessment of Disposal Facility for Low and Intermediate Level Waste (LILW)" and "Site Investigation and Siting Procedures of Disposal Facility for LILW" were held.

Roundtable discussions were held on the following topics:

(1) Revision on the Consolidated Report on RWM and IAEA Joint Convention

It was recognized that it is useful for the FNCA countries to revise the Consolidated Report and was agreed.

Uranium Glass Centerpiece

Waste Rock Yard

(2) Interim Reporting of Decommissioning/ Clearance Task Group Activity to confirm the result of Discussion/Survey Meetings which were held in Indonesia and the Philippines in August 2005.

(3) "RWM Three-Year Work Plan for 2005-2007" and a draft of the minutes of the Workshop Items agreed by the Workshop participants are as follows:

- The FNCA 2006 RWM Workshop will be held in China in 2006.
- The Discussion/Survey Meetings on Decommissioning /Clearance will be held respectively in Australia and Malaysia in 2006.
- The Revised Consolidated Report (interim version) will be issued by the end of March 2007 and the final version will be published by the end of March 2008.

In advance of the Workshop, extra technical visits to Kyoto University Research Reactor Institute (Kyoto University Research Reactor (KUR)) and Japan Synchrotron Radiation Research Institute (Spring-8) were made, and also, technical visits to the Ningyo-Toge Environmental Engineering Center, JAEA (Open-Pit Mining Site, Decommissioning Waste Storage Facilities, etc.) and a studio of uranium glass product operated by the Kagamino Town Office were carried out.

Nuclear Safety Culture

The FNCA 2005 Workshop was held on June 6 –10, 2005 in Yogyakarta, Indonesia. This Workshop was hosted by National Atomic Energy Agency (BATAN) and National Nuclear Energy Regulatory Agency (BAPETEN) as the local host organizations and Australian Nuclear Science & Technology Organisation (ANSTO).

The 2005 Workshop included for the third time, a peer review of the host country's research reactor. The peer review process was undertaken at KARTINI Research Reactor of Yogyakarta Nuclear Research Center, BATAN in two days of the Workshop.

At first, the Workshop participants were divided into two peer review groups to consider each topic. The two groups visited and observed the research reactor and other laboratories and interviewed the KARTINI staff on management and operation at the workplace. Consideration of Self-Assessment Report on KARTINI Research Reactor was also made.

Next, reporting and discussion was held within each peer review group based on the results of peer review, followed by further discussion between each peer review group and BATAN/ BAPETEN counterparts.

A plenary meeting was held to report the results of those discussions and to identify good practices and potential areas for improvement. During the peer review process, the KARTINI staff exhibited ownership, openness and eagerness. The peer review was undertaken in a cooperative spirit of the FNCA and seen as an effective vehicle for fostering and strengthening safety culture.

The Peer Review Report identified 29 good practices and made 14 recommendations for improvements of safety management and safety culture at KARTINI Research Reactor.

Viet Nam and Korea reported on progress status on recommendations arising from past peer review presentations and were appreciated by the Workshop participants for their endeavors to progress that have been made. Further discussions were held on future activities of the Nuclear Safety Culture (NSC) Project. Items agreed by the Workshop participants are as follows:

- Next peer review should be held separately from the FNCA 2006 Workshop on NSC.

- Both next peer review and the FNCA 2006 Workshop should be held respectively in Malaysia. Consideration will be given to scheduling the peer review several months before the Workshop.

Discussion between the Peer Review Group (left side) and BATAN/BAPETEN Counterparts

Observation in the Reactor Hall

Human Resources Development

It is necessary for us to make a progress of the peaceful use of radiation and nuclear energy. In this regard, the Human Resources Development (HRD) is the very important project. Securing of HRD is top priority for all the FNCA countries that try to spread and to introduce nuclear power plant and the radiation application use.

★ The FNCA 2005 Workshop

FNCA 2005 Workshop on Human Resources Development (HRD) was held on September 13-16, 2005 in Dalat, Viet Nam. The themes and contents of the country reports for the Workshop were as follows, as proposed in the last Workshop and agreed in the Sixth Coordinators Meeting held in March 30 - April 1, 2005:

1. Recent topics in the nuclear field and related HRD in each country
2. Conceptualization of Asian Nuclear University (ANU) proposed by Viet Nam in the Ministerial Level Meeting 2004 (ANU = Former ANTEP)
3. Summary of the HRD Strategy Model
4. Proposed future plan of FNCA HRD Project from Japan

At the Sixth FNCA Ministerial Level Meeting, representatives from each country discussed about the "HRD in Asia" and agreed that "Asian Nuclear Training and Education Program (ANTEP)" plan is an organically linked network for making effective use of existing educational and training resources in the field of nuclear energy in all of the participating countries.

At the Seventh FNCA Coordinators Meeting, Mr. Matsuzuru reported on the outcome of the survey on the needs and possible training programs offered to ANTEP, and based on this, the following points were discussed:

1) Delegates appreciated and supported the progress of ANTEP.
2) Importance of the result of the first survey was noted and necessity of the second survey was recognized to provide more detailed information.
3) Some countries expressed that the financial conditions of programs should be taken into consideration. Necessity of in-kind contribution was pointed out under the principle of partnership, and the importance of working language in the program was noted.
4) ANTEP's function and the next steps including pilot program were discussed.

Discussion at Workshop 2005 in Vietnam

Industrial Application

★Objective

Objective of the project is to develop new technology of low energy electron beam (EB) irradiation system that has a variety of applications and good safety features, and to demonstrate its application. A self-shielded low energy accelerator system needs an initial investment much lower than a Co-60 facility. Its operation is simple and safe. The system can be applied in various fields such as radiation processing and environmental conservation, etc.

The first project in the field of industry aims at wider application of the electron accelerator and implementation of practical application to bring benefits for participating countries through not only information exchange but also joint studies by taking experimental data.

★Achievement from FY 2001 through FY2005

Specific Results and Outcomes:

1) Through the workshop, the experience, data and technical information on the applications of low energy electron accelerators derived from this project are shared with other members of the FNCA countries.
2) Research collaboration for radiation processing of natural polymers using electron beam was conducted at JAERI-Takasaki under MEXT program and bilateral cooperation.
3) The demonstration on liquid sample (degradation of natural polymer), solid (crosslinking of thin film), gas (flue gas) and wastewater were successfully implemented at ;

JAERI-Takasaki (2002), MINT (2003), CAEP/ Tsinghua University (2004) and KAERI (2005), respectively.

4) Development of new technology:

Application of radiation degraded natural polymers such as alginate, chitosan and carrageenan as plant promoter has been carried out in Indonesia, Japan, Philippines, Thailand and Vietnam.

EB crosslinking of thin film/sheet of agar hydrogel and sago starch hydrogel for wound dressing and face masks respectively have been commercialized in Malaysia. In Japan, EB crosslinked hydrogel has been commercialized using CMC for bed sores, PVA for wound dressing.

EB treatment of flue gases is being commercialized in China and developed on a semi-pilot scale in Malaysia and Korea. Radiation treatment of VOC has been developed at the laboratory scale in Japan, China and Korea.

EB treatment of textile wastewater is being commercialized in Korea.

The last FNCA Ministerial Meeting welcomed the participation of Dr. Abdul Moyeen Khan, Minister of Science and Technology of Bangladesh as an observer. The Minister expressed his Government's sincere wish to be a member of FNCA. In this context the article on the application of nuclear technology in Bangladesh is presented in this issue for your information.

Sueo Machi, FNCA Coordinator of Japan

FROM BANGLADESH

Peaceful Uses of Nuclear Techniques in Bangladesh

Dr. C.S. Karim, *Chairman, Bangladesh Atomic Energy Commission*

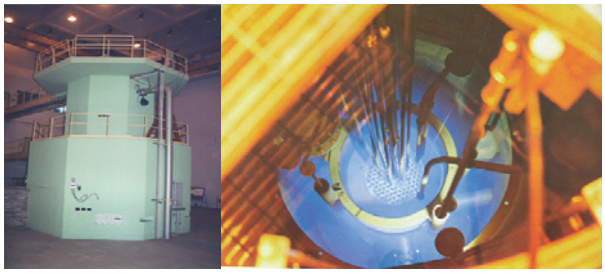
Bangladesh has acute constraints of resources, especially that in primary energy. The present low base of energy availability both in terms of primary energy and its final form i.e. electricity makes it difficult to attain goals of socio-economic advancement. For example, per capita generation of electricity is only about 140 kWh, which is extremely low when compared to the Asian average of about 700 kWh or world average of over 3000 units.

In spite of the constraints, Bangladesh is making progress in many socio-economic areas. Literacy rates is on the rise, especially in cases of girls. This was made possible due to various policy interventions, such as free education for girls, food for education and increased government allocation for the education sector, etc. The poverty reduction strategy of the Government is now the cardinal consideration in all development programs. Various programs on micro-credit have also far reaching impact in unlocking poverty and improving empowerment of different economic groups and the women. Participation of private sector in conjunction with the Government effort levels, intervention policy and strategy etc. are playing a vital role in advancement of the society. The future direction of the nation is to pursue her goal of social advancement. The Government recognizes the role of science and technology in the development of the country. A full fledged Ministry of Science and Information & Communication Technology was formed to facilitate promotion of science and technology. In fact, the present year is declared as "Science for Life" by the Government, which is an evidence of the Government commitment to science and technology.

Bangladesh wishes to build up a knowledge-based society for the future. IT would be an essential backbone for attaining such a goal. With this in view the Government has declared IT as one of the thrust sectors and has declared a policy to prepare the nation for facing challenges related to the needs and priorities of the sector.

Bangladesh is a peace loving nation. Bangladesh, with this objective in mind, has signed the whole range of agreements and protocols, etc. related to the international non-proliferation and verification regimes, such as NPT, Bilateral Safeguards agreement with the IAEA, Additional Protocol, CTBT as well as Nuclear Cooperation Agreements with foreign countries, including the USA. The Government is keen to establish enabling/supportive synergy between science and technology and in particular nuclear technology on one hand and development goals on the other. Programs of Bangladesh Atomic Energy Commission focus on this need. Part of the present activity relates to basic research in nuclear science & technology, while the rest are related to the issues of national development. These are centered around the 3MW research reactor, which is used for producing medical isotopes and also for various R & D programs. Other facilities are used for testing arsenic in ground water, elemental analysis, environmental studies, safety and radiation control, electronic repair maintenance and design; material science, exploitation of heavy mineral from beach sand, development of a tissue bank; preservation of food stuff, medical supplies using gamma ray; quality of food products, polymer technology and composite materials, development of bio materials, neutronic calculations and others. Application of nuclear techniques in diagnosis and therapeutic services is provided through 14 nuclear medical outlets and over 160,000 patients/per year are attended country-wide. The Government attaches high priority to the introduction of nuclear power in the future generation-mix of the country considering its role in improving power generation as a part of its policy on energy security sustainability, reliability, environmental advantages and other economic advantages. The site Safety Report responsive to latest international codes, guide and standard as well as the bid invitation document for a 600MW nuclear power plant have been prepared, which are some of the evidences of works in the pre-implementation phase of the project. International supplier countries will be contacted to explore possibilities of technology transfer and financing.

Reactor operation & Maintenance



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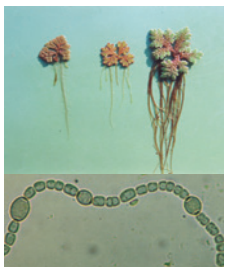


The 2nd Panel Meeting
held January 25-26, 2006 Tokyo, Japan

The meeting was attended by 24 participants from 7 FNCA member states; China, Indonesia, Japan, Malaysia, the Philippines, Thailand, and Viet Nam. Prof. Kondo, Chairman of AEC of Japan presented the opening address.

Session 1: Summary of the 6th MM

Dr. Machi, Commissioner of the Japan Atomic Energy Commission briefed on the outcome of the 6th Ministerial-Level Meeting and reported the recent global trend in the role of nuclear energy.

Session 2: Country Reports

Representatives from participating countries reported their nations' energy demand outlook, the role of nuclear energy, and common issues in introducing nuclear power generation.

Session 3: Energy Outlook in Asia – Role of Nuclear Power –

Common Understanding:

(1) Rapid social and economic development will bring an accelerated increase in energy demand in the region of FNCA countries.

(2) With limited fossil fuel reserves, the FNCA region is projected to increase its dependency on the importation of oil, natural gas and other resources.

(3) The global environment is deteriorating due to global warming caused by carbon dioxide released from using fossil fuels.

(4) Effective future options for ensuring a stable energy supply and mitigating the further acceleration of global warming include promoting energy conservation, improving the efficiency of fossil energy use and the approach of optimum energy combination.

Session 4: Role of Nuclear Energy in Mitigating Global Warming

Common Understanding:

(1) FNCA countries are facing a rapidly increasing energy demand. It is necessary to ensure stable energy supplies while continuously addressing concerns about global warming.

(2) Nuclear energy is one of the practical energy sources to contribute to mitigating global warming.

(3) Some delegates showed interest in a suggestion to appeal COP to review nuclear power generation to be included in CDM.

Session 5: Common issues for the introduction of nuclear power generation

(1) Safety of nuclear power generation

(2) Development of human resources and a technological infrastructure

(3) Economic viability

(4) Initiatives for developing a national consensus

(5) Nuclear non-proliferation

The participants agreed that the panel is a useful and fruitful forum to share experiences and information among countries.

Delegates emphasized interests in human resource development, public acceptance, economic feasibility and financing analysis for nuclear power and agreed that the draft of the final report would be prepared and submitted to the 3rd panel meeting in cooperation with the Panel members.

The 7th FNCA Coordinators Meeting
held March 1-3, 2006 in Tokyo

The Seventh FNCA Coordinators Meeting (CM) was held from March 1 through March 3, 2006 in Tokyo, Japan, hosted by the Atomic Energy Commission (AEC) and Cabinet Office (CAO) of Japan.

The Meeting was attended by delegates from FNCA countries, i.e., Australia, the People's Republic of China, Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Thailand and Viet Nam. Dr. Abdul Aziz, Bangladesh Atomic Commission (BAEC) and Dr. Nahrul Khair Alang Md. Rashid, RCA Chairman, IAEA participated in this meeting as observers.

Main agenda:

- Report on the Sixth FNCA Meeting
- Report on "Role of Nuclear Energy for Sustainable Development in Asia"
- Invited Speech
  (1)"Current IAEA/RCA Activities and Achievement" by IAEA
  (2)"Overview of Current Nuclear Science and Technology", "Biofertilizer" by Bangladesh
- Progress, Evaluation and Planning of FNCA Projects
- Wrap-up Session

At the Meeting, the activities of on-going 12 projects in 8 fields and their future plans were reported, and also Evaluation and Planning of the three projects, namely, Biofertilizer, Nuclear Safety Culture, Industrial Application (Electron Accelerator), were made.

An implementation plan of the Asia Nuclear Training and Education Program (ANTEP) that was agreed at the 2005 FNCA Ministerial-level Meeting was discussed. As the cultivation of Human Resource is the first priority not only for the countries that have plans to introduce nuclear power generation but also the countries that plan to promote and develop utilization of radiation, the concept of ANTEP was agreed as an organically network which unites the existing needs and program among FNCA countries. Based on the agreement, the result of survey which was carried out to grasp needs of training and education in FNCA countries and the program in a country can contribute to the other FNCA countries was presented, and a practical plan and its schedule were discussed.

Evaluation of FNCA Project Activities

Why evaluate?

The aim of evaluation is to improvement a Project Activity to successful achievement, which is defined as contributing to the enhancement of living standards and social development in Asian countries. The first evaluations were done of eight projects in 2004, and three in 2005.

What is evaluated?

The outcomes of project activities are evaluated from two points of view: socio-economic impact; and scientific impact. Publications and ripple effects are also considered.

How is the evaluation used?

The evaluation is reflected in the plan for the project, i.e., continuation, change of content, or termination.

Who does the evaluation?

The evaluation is carried out by the mechanism shown in the chart.

Mechanism and Procedures of Evaluation

What is the Forum for Nuclear Cooperation in Asia (FNCA)?

Vision

Enhancing socio-economic development through active regional partnership in the peaceful and safe utilization of nuclear technology.

Member Countries;

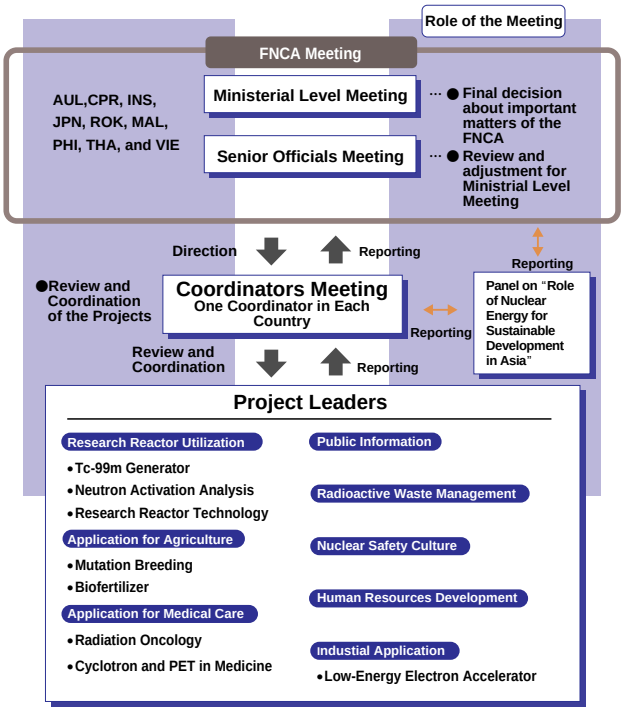
Australia, China, Indonesia, Japan, Korea, Malaysia, the Philippines, Thailand, and Viet Nam
* IAEA, Bangladesh as observer

Framework;

The following are the basic framework of cooperation.

1. Ministerial Level Meeting (MM);
   Ministerial level representatives responsible for nuclear research, development and utilization attend to discuss nuclear policy or cooperative measures. Senior Officials Meeting (SOM) is attached to MM as an preparatory meeting.
2. Coordinators Meeting;
   One FNCA Coordinator was appointed for each country, and these Coordinators discuss introduction, modification, termination, coordination, evaluation, and so on, of cooperative activities.
3. Cooperative activities for each project.

The FNCA Framework



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