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## THE 15TH FNCA MINISTERIAL LEVEL MEETING NOVEMBER 19<sup>TH</sup>, 2014, SYDNEY AUSTRALIA



*A Scene of the Meeting*

The 15th FNCA Ministerial Level Meeting (MM) was held at Sydney Harbour Marriott Hotel, Australia on November 19, 2014, and organised by Australian Nuclear Science and Technology Organisation (ANSTO) and the Cabinet Office of Japan (CAO). The meeting was attended by ministerial level representatives (including 2 ministers and 2 vice ministers, the directors of the nuclear administrative agencies, and others) from 12 member countries i.e., Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, Republic of Korea (ROK), Malaysia, Mongolia, the Philippines, Thailand, and Vietnam.



(Left) Mr Nobuyasu Abe, Vice Chairman, Japan Atomic Energy Commission (JAEC)  
(Right) The Hon. Mr Ian Macfarlane, Minister for Industry, Australia

### (1) Opening

The Hon. Mr Macfarlane, Minister for Industry, Australia, made opening and welcoming remarks. He expressed Australia's stance to continuously prioritise the safe, secure and peaceful development of nuclear technology in the region and expected that the discussion on the meeting would help member countries to further mutual cooperation in the field of nuclear energy, with the recognition to significant results achieved through FNCA projects. The Hon. Mr Shunichi Yamaguchi, Minister of State for Science and Technology Policy, CAO, made his address in video message, since he was absent from the meeting.

### (2) Country Reports

Each of the 12 participating countries delivered their country report, focusing on national nuclear energy policy and action plan and expectations for FNCA. (See pages 3-5 for the summary of the reports.)



*The Hon. Mr. Yamaguchi*

### (3) Reports of FNCA Activities

Dr Machi, FNCA Coordinator of Japan, reported the current project activities including tangible outcomes and future plan of FNCA projects. Mr Abe, Vice Chairman, JAEC reported the results of the “6th Study Panel on Infrastructure Development for Nuclear Power” held in Hanoi on August 26-27, 2014. He proposed that FNCA start the 4th phase of the Study Panel, titled “Study Panel on Policy and Technology to Promote Nuclear Energy for Sustainable Development”. It would cover policy of nuclear energy development including nuclear power as well as applications and technical challenges to materialize policies, and be held back to back with Coordinators Meeting. (See pages 17 for details.)

### (4) Strategy for Application of Multi-Purpose Research Reactor

Dr Storr, Group Executive for Nuclear Science and Technology of ANSTO, introduced ANSTO’s experience in the design, construction, commissioning and operation of the OPAL research reactor. Mr Kishi from Japan Atomic Energy Agency (JAEA) introduced current status of neutron utilization at Japanese research reactor JRR-3 and Prof. Dr Wisnubroto, Chairman of National Nuclear Energy Agency of Indonesia (BATAN) outlined utilization of G. A. Siwabessy reactor. Dr Machi encouraged the establishment of a regional network for production and stable supply of Mo-99, and to share information on design and application of research reactors among member countries. Discussions noted the importance of education and training both in terms of developing expertise in operating reactor and building user communities, particularly in the neutron scattering space. The great variety of potential applications of research reactors was emphasized, as were the importance of regional collaboration and the desirability of sharing access to regional facilities in areas such as neutron activation analysis and neutron scattering science.

### (5) Meeting Resolution

A draft resolution of the 15th FNCA Ministerial Level Meeting was presented to the participants, and it was agreed after some modifications.

The Followings are the points of the Meeting Resolution.

- Encouraging FNCA ministerial level leadership and coordinators’ active involvement in designing the FNCA’s future direction and program in order to further advance the FNCA’s 15 years of achievement.
- Launching the 4th phase of the Study Panel on Nuclear Energy focusing on policy matters, technical challenges, and effective international cooperation on nuclear energy applications and development in both nuclear power and nuclear applications, and organizing the new Study Panel and the Coordinators Meeting back-to-back.
- Advising the Human Resources Development Project to hold a workshop to discuss the important policy for nuclear human resources development every three years with the participation of the senior officials from member countries.
- Continuing to enhance building a nuclear security culture through human resources development activities with the recognition of the importance of nuclear security in the Asian region where further development of nuclear utilization is expected.
- Encouraging the senior officials of the relevant member countries to strengthen linkages with their respective stakeholders, including relevant ministries, in order to enhance the application of the significant tangible outcome of the projects of mutation breeding, bio-fertilizer and radiation processing of natural polymers for improving agricultural production.
- Strengthening efforts to make the high performance research reactors in the region available to users, collaborators and trainees in other regional countries.
- Continuing to share information concerning the demand for and supply of molybdenum-99 and scheduled reactor outages, particularly in the light of future planned increases in production capacity in the region.



*Delegates of Member Countries*



# Summary of Country Reports

Presented at the 15th Ministerial Level Meeting

## Australia

Australia is a long-term strong supporter of non-proliferation. Our new reactor OPAL runs on low-enriched fuel and we have always made the medical isotope Molybdenum-99 using low-enriched uranium targets. A recent investment of \$168.8 million by the Australian Government in a new production facility will boost the supply of Molybdenum-99 to the region. Our innovative use of nuclear technology helps drive positive outcomes in health, industry, research and the environment, and we continue to welcome opportunities, such as through the FNCA, to share our experiences and expertise with our regional neighbours. Australia looks forward to continuing to support FNCA projects and is delighted with the outcomes of those projects during the past year. As the growth of nuclear gains momentum in the region, we need to work together in communicating with the public and on building and maintaining public confidence in nuclear science and technology.



The Hon. Mr Ian Macfarlane  
Minister for Industry

## Bangladesh

The Bangladesh government has declared in its vision to provide electricity to all by 2021 by generating about 20,000 MW of electricity - 10% of which is expected to be coming from nuclear. The implementation of country's first NPP at Rooppur site has been approved by the National Parliament in December 2010. Besides, an Act called "Bangladesh Atomic Energy Regulatory Act" has been passed in the National Parliament on 31 May 2012 and an independent regulatory body is established under the provisions of this Act.

We expect regional collaboration and cooperation, sharing of skill, knowledge and experience and also Japanese leadership in nuclear related activities through FNCA to be continued.



Mr Md. Monirul ISLAM  
Chairman, Bangladesh Atomic Energy Commission

## China

China has attached great importance to the nuclear safety, nuclear security and nuclear emergency, continuously improved the law and regulation system of nuclear safety and nuclear emergency, and strengthened the infrastructure construction. At present, a total of 21 units are in operation in mainland China, with a total installed capacity of 19.02 GW. And another 27 units are under construction, with a total installed capacity of 29.53 GW.

China believes that FNCA has played a significant role in the nuclear technical exchange and cooperation among the member countries. We hope that more attention should be focused on the cooperation priorities related to nuclear technology exchange and experience sharing, so that the effective participation of each member state can be further strengthened while the actual effects of FNCA projects can be further enhanced.



Mr WANG Yiren  
Vice Chairman, China Atomic Energy Authority

## Indonesia

The goal of Indonesia energy policy is to realize energy independence and security for supporting sustainable national development. The main energy policy for the next decades is to shift to new and renewable energy. It is expected that in the year 2025 the contribution of energy generated from new and renewable energy could attain about 23% of total energy and 30% in 2050. Nuclear energy as part of new energy is still an option in the long term energy planning. Recently, the Ministry of Energy and Mineral Resources has initiated the development of white paper on the acceleration of introduction 5000 MW NPP in Bangka Belitung.

We expect FNCA to continue the cooperation to promote the nuclear technology utilization, reflect the common needs and support the development of human resources capacity.



Prof. Dr Djarot Sulistio  
WISNUBROTO  
Chairman, National Nuclear Energy Agency

## Japan

The New Strategic Energy Plan was approved in April, in which Good balance of 3E + S (Energy Security, Economic Efficiency, Environment and Safety) is the basic policy and nuclear power is an important base-load power source as a low-carbon, quasi-domestic energy source.

In Fukushima, decommissioning and contaminated water management is progressing, evacuation orders were lifted in some affected areas in April, marine monitoring results are published daily and foods monitoring weekly and an international collaborative research center on decommissioning will be established in April 2015.

Japan expects that all of the FNCA participants recall the FNCA pioneers' spirits and show the Ministerial level leadership and proactive involvement of Coordinators in designing the future FNCA's direction.



Mr Nobuyasu ABE  
Vice Chairman, Japan Atomic Energy Commission

## Kazakhstan

The Republic of Kazakhstan has been conducting policy for the development of nuclear and radiation technologies application in various fields. Newly established Ministry of Energy is responsible for implementation of state policy in nuclear energy application.

Kazakhstan has supported IAEA initiative for the creation of International Bank of low enriched uranium considering that its realization will significantly contribute to reduction of risks for proliferation of nuclear fuel cycle sensitive technologies and enhancement of global nuclear security.

We seek active collaboration with all member-states of FNCA in the field of safety culture development, nuclear and radiation technologies applied in medicine as well as in all other issues of nuclear and radiation applications.



Dr Erlan G. BATYRBKOV  
Director General, National Nuclear Center

## Republic of Korea

Today, with 23 operating nuclear reactors that generate 30% of its electricity, Korea is the world's fifth-largest nuclear energy producer and plans are underway to build 11 new reactors. The Korean government established a Nuclear Energy-based Creative Economy Action Plan (2013-2017) to expand its research infrastructure.

Korea has strengthened its partnerships with FNCA member countries from its beginning in 1990 and will continue to cooperate with members in the areas of research reactor utilization development, radiation utilization development, nuclear safety strengthening, and nuclear infrastructure strengthening. Korea firmly believes that the FNCA has played a crucial role in promoting nuclear cooperation in the Asian region.



Mr Hai Joo MOON  
Director General of Space and Nuclear Technology Bureau, Ministry of Science, ICT and Future Planning

## Malaysia

Malaysia is currently considering implementing nuclear energy as one of fuel options for electricity supply post-2020, especially in Peninsular Malaysia.

In the area of radiation processing of natural polymers, Malaysia has shown significant improvement in quality and yield of Chili Kulai Hybrid Plant and Rice Plant using Oligochitosan as Plant Growth Promoter (PGP) or Elicitor. The biofertilizer products such as aGricare® ORGANIC-N and Bioliquifert that have been developed by Malaysian Nuclear Agency has been successfully commercialized.

Malaysia will continue to support and take part actively in the FNCA activities. Malaysia hopes that FNCA platform will continue to assist new comer countries like Malaysia, in the nuclear power development program by sharing knowledge and experiences.



The Hon. Datuk Dr Abu Bakar Bin MOHAMAD DIAH  
Deputy Minister of Science, Technology and Innovation



## Mongolia

The Parliament of Mongolia approved State policy of Mongolia on "Exploration of radioactive minerals and nuclear energy" in 2009. The purpose of this state policy is to deeply explore radioactive minerals resources and become one of the leading countries on exploitation, processing and exporting of uranium production for peaceful purposes, and utilize nuclear energy in social and economic sectors in extensive ranges through introducing technology friendly to human health and environment.

Mongolia expects FNCA to share the experiences of member countries according to the Research reactor and NPP, develop human resource for nuclear technology including future RR&NPP, and strengthen regulatory body and the international cooperation in the region.



Mr NOROV Tegshbayar  
Director General, Nuclear Energy  
Agency

## Philippines

The Philippines, under the framework of its Harmonized Science & Technology Agenda, continues to harness nuclear technologies that seek to address national concerns in the areas of agricultural productivity, food safety and security, industrial competitiveness, public health and disaster risk mitigation. In the field of nuclear energy, it maintains the nuclear option in the long term and supports capacity building and associated HRD activities.

Since the young generation will be the future decision makers, the Philippines is participating in the IAEA Pilot Project Initiative, "Nuclear Science and Technology for Secondary Schools: Compendium of Resources and Activities for Teachers and Students" in partnership with the Philippine Department of Education. Two public secondary schools have been chosen as pilot schools, and the project has already started in October 2014. The Philippines expects FNCA to serve as a regional cooperative framework and work in synergy with other regional cooperative agreements/initiatives.



The Hon. Dr Amelia P.  
GUEVARA  
Undersecretary for Research and  
Development, Department of Science  
and Technology

## Thailand

In 2007, Thai cabinet approved Thailand's Power Development Plan 2007-2021 (PDP 2007) which includes the nuclear power generation to supply 2,000 MW of electricity in 2020 and another 2,000 MW in 2021, but it has been revised several times due to the change in the electricity demand. Under the 3rd revision, NPP project has been postponed for 6 years to promote the public understanding of NPP and fill major gaps identified by INIR mission from IAEA.

Thailand can be beneficial from technology transfer among the FNCA member countries especially in quality control and assurance in TSO services and maintain technical knowledge and competencies. With the coordination from FNCA, it can strengthen the capability of the TSO in Thailand in the future.



Dr Somporn CHONGKUM  
Executive Director, Thailand Institute  
of Nuclear Technology

## Vietnam

Vietnam has introduced an ambitious nuclear power program (VNPP), the first 2 NPP projects are under consideration (FS phase). Vietnam needs to develop a sustainable nuclear power program, in which the human resources and R&D are essential, and also focuses on promoting application of nuclear energy for peaceful purposes.

Vietnam is in the opinion that, the Japanese leadership in NPP and Non-NPP through FNCA is very much appreciated and need to be continued. Member countries benefitted a lot, especially for newcomer countries with objective of preparing the infrastructure for NPP, where, through FNCA, early planning and capacity development could be achieved.



Dr CAO Dinh Thanh  
Vice President, Vietnam Atomic  
Energy Institute

# INTRODUCTION OF 10 ON-GOING FNCA PROJECTS

## Radiation Utilization Development Industrial/Environmental Utilization

### Mutation Breeding Project

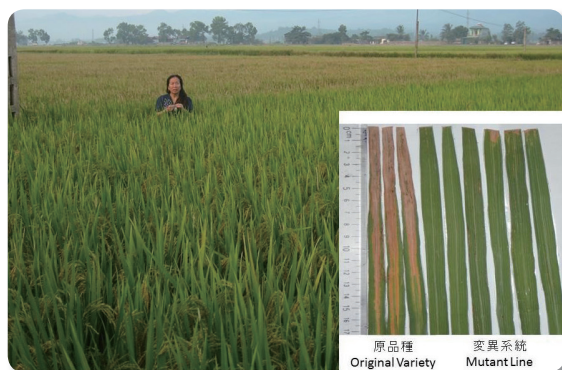
The goal of this project is to help increase the production of food and improve quality of food in Asian countries by developing new mutant varieties that are more resistant to drought, insects, and diseases. The new mutant varieties were developed by using radiation breeding technology, such as gamma rays and ion beams, for the production of rice, bananas, orchids, sorghum, and soybeans, which are important crops in Asia.

Since 2013, a new activity has been underway that focuses on the mutation breeding of rice for sustainable agriculture in Asia. This new activity involves the use of gamma rays or ion beams to establish mutant, high-yielding varieties under low input conditions and to establish new varieties that are tolerant to diseases, drought, and other changes in the climate.

### Recent Achievements

Research on the composition and quality in rice, one of three major cereal crops in the world, was begun in 2007. It focused on improving the quality of rice and pursued the common goal of modifying the content of amylose that is closely relevant to cooking and eating quality. It also focused on the specific goals of high yield and environmental tolerance, such as the tolerance of high salinity, according to the each country's demands.

As to the said phase, information was shared and irradiation facilities were utilized together for the research. This activity was successful in developing promising mutant lines that are well-suited for the needs of each member country, and this part of the work was concluded in Japanese Fiscal Year 2012. Some of the new mutant varieties developed in this activity were officially registered and promoted to farmers in Bangladesh and Vietnam. Former products of this project, such as a Mutation Breeding Manual and an Achievement Report for each activity, are provided on the FNCA website (<http://www.fnca.mext.go.jp/mb/introduction.html>).



Mutant line with high resistance to bacterial leaf blight in Vietnam

### Outline of the Workshop

■ Period: January 27-30, 2015

■ Venue: Hangzhou (China)

■ Number of Participants: 16

(Bangladesh, China, Indonesia, Japan, Malaysia, Mongolia, the Philippines, Thailand, Vietnam, and observer from IAEA/RCA)

On the first day, an open seminar entitled “Application of Mutation Breeding for Sustainable Agriculture” was held in conjunction with the “4th International Symposium on Germplasm Innovation and Molecular Breeding” (4th ISGIMB), which was hosted by Zhejiang University. The Symposium was attended by more than 150 participants from agricultural institutes and universities in addition to participants from FNCA member countries.

Member countries gave their 2014 progress reports and presented their plans for the project on the mutation breeding of rice for sustainable agriculture. This was followed by a discussion of various aspects of sustainable agriculture and how mutation breeding can be used to contribute to low-input, sustainable agriculture. Follow-up reports also were presented on the sub-projects related to bananas, orchids, sorghum, and soybeans.

The new IAEA/RCA project that will begin in 2016 was introduced, and the project will focus on promoting mutation techniques and related biotechnologies for the development of a variety of green crops.

The participants also discussed their cooperation with other FNCA agricultural projects. Some countries already have conducted collaborative work in conjunction with the FNCA Biofertilizer project and Electron Accelerator Application project to provide synergetic effects in increasing yields and reducing the use of pesticides on rice. It was proposed that cooperation between the biofertilizer project and mutation breeding be promoted to reduce the cost of production.

On the second day, participants visited the China National Rice Research Institute. After a brief introduction provided by the Institute's staff, the participants visited laboratories and observed research equipment and the Institute's gene bank.



Open Seminar



Technical Visit in China  
National Rice Research Institute



## Biofertilizer Project

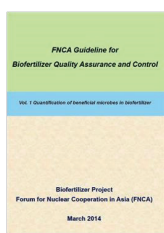
Soil contains a large number of microorganisms that benefit plant growth by improving the availability of essential nutrients. These microorganisms include symbiotic rhizobia and nitrogen-fixing bacteria, which supply nitrogen to plants, and mycorrhizal fungi and phosphate-solubilizing bacteria, which help in the absorption of phosphorus.

The aim of this project is to develop high-quality biofertilizers that can retain microbial activities for long periods. The strategy incorporates a radiation sterilization process for the carriers<sup>\*1</sup> that does not change their properties, followed by mixing of microbes that are beneficial for plant growth. These biofertilizers are expected to promote environment-friendly and sustainable agriculture in the Asian region, by increasing crop yields while reducing the environmental burden of excessive use of chemical fertilizers.

## Recent Achievements

Production of biofertilizer carriers using the radiation sterilization technique requires close cooperation between a nuclear research institute that has a radiation facility and the agricultural research institute studying the biofertilizers. This type of cooperation has been promoted through discussions at workshops about these projects as well as through proactive appeals made by member countries. The radiation sterilization technique for carriers is being transferred to the private sector, and biofertilizer products produced by it are already in widespread use throughout Indonesia, Malaysia, and the Philippines. Thailand is also in the process of successful commercial use. Malaysia has developed many kinds of biofertilizer products in close cooperation with industrial entities.

The “FNCA Guideline for Biofertilizer Quality Assurance and Control, Vol. 1 Quantification of beneficial microbes in biofertilizer (<http://www.fnca.mext.go.jp/bf/guideline.pdf>)” was published in 2014. Another book, “Vol.2 Production of biofertilizer carrier using radiation,” has an expected release date of 2015.



Vol. 1 Quantification of beneficial microbes in biofertilizer  
FNCA Guideline for Biofertilizer Quality Assurance and Control

## Outline of the Workshop

- Period: November 24-27, 2014
- Venue: Kuala Lumpur (Malaysia)
- Number of Participants: 12  
(China, Indonesia, Japan, Malaysia, Mongolia, the Philippines, Thailand and Vietnam)

This is the final fiscal year of the third phase (JFY2012-2014); therefore, progress and research summaries for the past three years were reported by each member country. The

participants also participated in active discussions on the core topics involving research and development of biofertilizers: (1) application of radiation sterilization of carriers for production of better quality commercial biofertilizers, (2) development of multifunctional biofertilizers and strategy for extension to farmers, (3) evaluation of results of experiments on the synergistic effect of biofertilizers and irradiated oligochitosan,<sup>\*2</sup> and future prospects, and (4) development of the FNCA Guideline Vol.2 Production of biofertilizer carriers using radiation



Workshop

Proposals were made during discussion session regarding the three year evaluation and project activity plans for the next phase, including 1) compilation of data on the beneficial effects of irradiation carriers to maintain biofertilizer organisms in comparison to autoclaved<sup>\*3</sup> carriers, and 2) publication of the benefits of irradiated carriers in comparison with autoclaved carriers. An agreement was reached that member countries would continue to disseminate the use of irradiated carriers to biofertilizer producers, to study combinations of microbes to develop multi-functional biofertilizers, and to evaluate experiments for synergistic effects of biofertilizers and irradiated oligochitosan.

The participants took part in the Malaysia Agriculture, Horticulture, & Agrotourism Show that has been held every two years at Malaysia Agro Exposition Park, Serdang. The technical tour was guided by Ministry of Agriculture and Agrobased Industries and Malaysian Agricultural Research and Development Institute. The participants visited various agro showcases in agriculture, plantation, fisheries, veterinary, and agro food production.



Participation in the Malaysia Agriculture, Horticulture, & Agrotourism Show

\*1 Carriers: Materials used to maintain and propagate microorganisms. Peat and compost are typically used.

\*2 Irradiated oligochitosan: Chitosan with molecular weight reduced by irradiation.

\*3 Autoclave: Pressure chamber used to sterilize equipment and supplies by subjecting them to high pressure saturated steam.

## Electron Accelerator Application

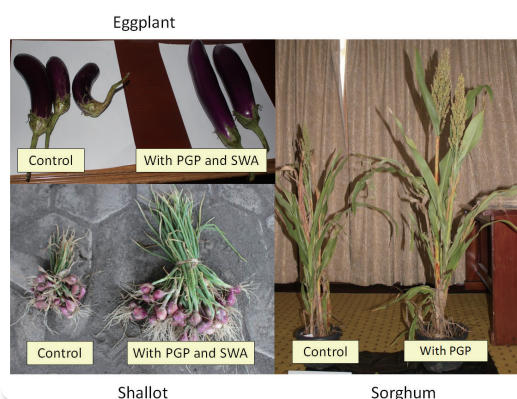
### Project

This project aims at widespread use of electron accelerators<sup>\*1</sup> and gamma-rays in the industrial field, and research has been conducted on practical applications of radiation processing to promote technology transfer for the benefit of the participating countries. Recent major activity includes R&D activities associated with the development of a plant-growth promoter (PGP) and a super water absorbent (SWA) as a soil conditioner. Information and experimental data obtained by each participating country were shared with the rest of the countries as well as the IAEA/RCA to promote the synergistic effects of the R&D activities. A new guideline will be completed early in JFY 2015 to promote the application of PGP to rice and chili, both of which have a significant impact on the economy. Also, field tests have been conducted to evaluate the use of SWA as a soil conditioner in arid regions.

### Recent Achievements

Irradiated natural polymers<sup>\*2</sup> could be highly-active PGP and SWA for use in conditioning soil in arid regions. The results of the field tests conducted by each country showed that chitosan-based PGP that were degraded by radiation could increase the yields of several products, including chili, rice, vegetables, and fruit. PGP derived from chitosan have already been commercialized in Indonesia, Japan, and Vietnam. SWA produced by cross-linking of natural polymers have proven to be effective as water-retaining agents in the sandy soil of arid regions.

The “FNCA Guideline on Development of Hydrogel and Oligosaccharides by Radiation Processing” ([http://www.fnca.mext.go.jp/english/eb/eb\\_guideline\\_v1\\_5.pdf](http://www.fnca.mext.go.jp/english/eb/eb_guideline_v1_5.pdf)) was published in October 2009 and has been updated occasionally. It now serves as a reference for each country for the production and use of high-quality materials for the effective promotion of R&D and industrial applications. Also, on the FNCA website, there are lists of the electron-beam and gamma-ray irradiation facilities owned by FNCA's member countries to provide users with the information concerning the current status ([http://www.fnca.mext.go.jp/english/eb/e\\_projectreview.html](http://www.fnca.mext.go.jp/english/eb/e_projectreview.html)).



Effect of PGP and SWA on Crops (Indonesia)

### Outline of the Workshop

■ Period: February 9-12, 2015

■ Venue: Yogyakarta (Indonesia)

■ Number of Participants: 19

(Bangladesh, Indonesia, Japan, Kazakhstan, Malaysia, the Philippines, Thailand and Vietnam)

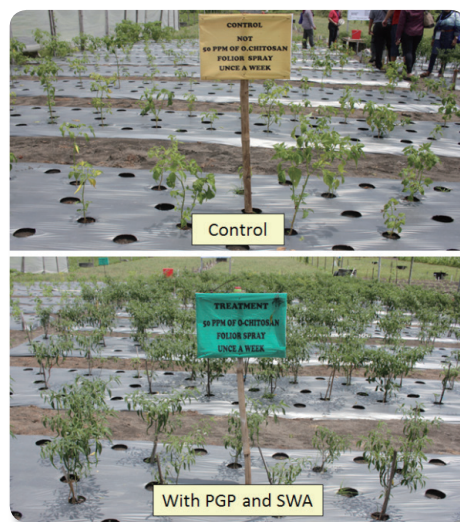
The workshop was attended by FNCA's eight member countries. The participants reported their progress in R&D related to the development on PGP and SWA by means of irradiation processing.

About 50 experts from local agricultural research institutes and industrial fields participated in the open seminar that was held on the first day of the workshop. Topics were related to the application of radiation technology to industry and agriculture in Indonesia and R&D on radiation processing for industry and the environment in Japan. There were active discussions after each of the five presentations.

During the workshop, the current status of field tests on PGP was reported by each participating country. Vietnam has succeeded in the commercial application of oligochitosan as an elicitor for rice plants and sugarcane, with 10-20% increases in the yields of rice. Thailand also has achieved the commercial application of oligochitosan as PGP and elicitor. Indonesia has conducted semi-field tests of oligochitosan on a variety of plants, including chili, rice, rubber tree, tomato, potato and shallot, achieving highly promising results with yields increased by 25 to 300%. In the meeting, it was recommended that commercialization of the PGP/elicitor produced from chitosan/carrageenan be target for JFY 2017.

As for the SWA, Thailand has implemented field tests on baby corn and achieved increases in yields of 45%, and promising results also have been obtained for bamboo and rubber tree plants. Currently, Indonesia is conducting experiments on shallot and chili in field that have sandy soil with highly-promising results.

The participants agreed to continue cooperation and collaboration with the IAEA/RCA in sharing information of radiation processing, including R&D on PGP and SWA.



Effect of PGP and SWA on Chili (Indonesia)

<sup>\*1</sup> Electron accelerator: The equipment is designed to produce high-energy electron beams by accelerating electrons using the application of high voltage; the equipment is used in radiation processing.

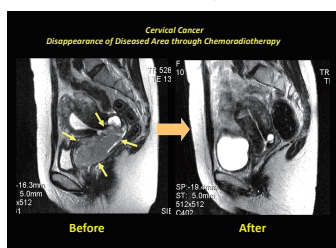
<sup>\*2</sup> Natural polymers: Such polymers are naturally-produced, high-molecular-weight compounds. Typical examples include cellulose, starch, proteins, chitin, and chitosan.



# Radiation Utilization Development Healthcare Utilization

## Radiation Oncology Project

The aim of this project is to promote the widespread use of radiation therapy and to improve its quality in the Asian region by establishing standardized radiation therapy protocols through joint clinical trials on the types of cancer predominantly observed in the region (especially cervical, nasopharyngeal, and breast cancers).



Disappearance of Gross Tumor after Chemoradiotherapy

## Recent Achievements

Standard treatment protocols have been developed through international joint clinical trials for cervical, nasopharyngeal, and breast cancers in 11 participating countries in the Asian region. Improvements in treatments have been obtained in the respective countries based on effective treatment methods obtained through clinical trials. The treatment results to date have been equivalent to, or superior to, those reported for other international clinical trials. Accordingly, the protocols developed in this project have been widely used in clinical practice, including in medical schools, in Asian countries.

The protocol CERVIX-III for chemoradiotherapy for cervical cancer has undergone clinical trials since 2004 and has been confirmed as effective for Asian people in the FNCA region. It has been adopted as the standard treatment method in clinical practice in Malaysia, Thailand, Vietnam, and other countries. The results of the clinical trials have been reported in original articles in international medical journals. The protocol CERVIX-IV for locally advanced cervical cancer, which has undergone clinical trials since 2008, has shown that it is efficient and effective for patients (the five-year overall survival and local control rates<sup>1</sup> were 68% and 91%, respectively).

## Outline of the Workshop

■ Period: November 4-7, 2014

■ Venue: Aomori (Japan)

■ Number of Participants: 35

(Bangladesh, China, Indonesia, Japan, Kazakhstan, ROK, Malaysia, Mongolia, the Philippines, Thailand, Vietnam and observer from IAEA/RCA)

In addition to the participants from the 11 FNCA member

states, a representative from India (a member of IAEA/RCA) attended the workshop as an observer.

The workshop consisted of reports and discussion of data from clinical trials on locally advanced cervical cancer, nasopharyngeal cancer, and breast cancer carried out in member countries. A discussion was also held on the new protocol for cervical cancer (CERVIX-V). This protocol includes 3D image-guided brachytherapy (3D-IGBT)<sup>2</sup>, which requires advanced skills. Therefore, the participants agreed that its feasibility must be examined for each member country. The session of the Phase II study of Hypofractionated Radiotherapy for Breast Cancer (BREAST-I) covered the results of the clinical trials, started in 2013, and reported that BREAST-I is equally as safe and efficient as conventional methods for breast cancer. An agreement was reached that long-term follow up and more patients are needed for validation. The session on quality assurance and quality control (QA/QC) of external beam radiotherapy involved reports on the survey results from dosimetry measurements in Thailand as well as on consultation for the commissioning of Radiophotoluminescent Glass Dosimeter (RGD) implementation at IAEA.

An open seminar on Radiation Use for Medical Application was held on the second day, attended by about 150 professionals involved in this field. In total, seven lectures were given on: 1) The MEXT program supporting HRD for nuclear energy and radiation utilization in Asian countries, 2) Application of radiation and isotopes in industry, agriculture, and environmental protection, 3) Introduction of the FNCA radiation oncology project, 4) 3D image-guided brachytherapy for cervical cancer, 5) Current status of cervical cancer in the Philippines, 6) Development of tumor motion prediction-based dMLC<sup>3</sup> control for real time use in radiation medicine, and 7) Current status of cytogenetic biodosimetry in radiation medicine.

The participants went on technical visits to the Hirosaki University School of Medicine and Hospital, the Advanced Emergency Medical Center, and Japan Nuclear Fuel Limited in Rokkasho Village.



Workshop



Technical Visit to Hirosaki University School of Medicine and Hospital

<sup>1</sup> Local control rate: A rate at which radiation focus is controlled.

<sup>2</sup> 3D-IGBT: A method of brachytherapy (intracavitary irradiation) that uses a treatment plan based on a three-dimensional image of a focal site taken by CT or MRI in brachytherapy. It is effective for controlling the dose to tumors and their surrounding normal tissues.

<sup>3</sup> dMLC: Abbreviation for Dynamic Multi Leaf Collimator; it indicates a set of metal sheets used for dynamic control of the shape and location of the area irradiated by a radiotherapy beam. It can move during irradiation, particularly to deliver an intensity-modulated beam.

# Research Reactor Utilization Development

## Research Reactor Network Project

The aim of this project is to improve the skill levels of researchers and promote the mutual use of research reactors in Asian countries. These targets will be achieved by enhancing mutual understanding regarding the features and the utilization status of research reactors in the relevant countries and by establishing a regional network. The project specifically endeavors to establish a regional network for the stable supply of radioisotopes (RI)<sup>\*1</sup> for medical applications.



Technical visit to RI production facilities  
Thailand Institute of Nuclear Technology (TINT)

## Recent Achievements

This project has just begun its 2nd phase (JFY2014-2016). At the 2014 workshop, information was shared with such themes as the current status of research reactors in each member country, plans to construct new research reactors, and production and use of RI, with the goal of promoting activities for establishing a regional network for the stable production and supply of RI conducted during previous phase. In addition, the members discussed the development of a network for production and supply of RI in the FNCA area as well as the demand and supply status of RI for medical use.

Most of the currently distributed Mo-99 was produced by nuclear fission. However, participants actively exchanged information on technology for the production of Mo-99 by the n-gamma reaction because of the advantages of this reaction in terms of non-proliferation and radioactive waste. An agreement was reached whereby the FNCA regional network would continue information exchange on the demand and production plans for Mo-99 between member countries as well as with the Nuclear Energy Agency (OECD/NEA) and AIPES.<sup>\*2</sup>



RI products for industrial, medical and agricultural application etc.

## Outline of the Workshop

- Period: October 14-16, 2014
- Venue: Bangkok (Thailand)
- Number of Participants: 26

(Australia, Bangladesh, Indonesia, Japan, Kazakhstan, ROK, Malaysia, Mongolia, the Philippines, Thailand, Vietnam and observer from IAEA)

At the workshop, reports were made on regional networks for the stable production and supply of RI, development of technology for production of Mo-99 using the n-gamma reaction, and design and planning of new research reactors to meet the needs of these applications. The participants discussed future cooperation between member countries in the design and application of test reactors, as well as the status of the regional network for the stable production and supply of RI.

The information exchange on planning and designing of new research reactors was deemed useful for Thailand, Vietnam, and Mongolia, which are planning to construct a new research reactor. Australia, China, Japan, and ROK have agreed to share their extensive experience in the design and construction of research/test reactors. Establishment of a coordination mechanism among major producers and consumers of Mo-99 was also proposed.

The open seminar included lectures on isotope and radiation technology for sustainable development provided by Australia, Japan, ROK, and Thailand.

Participants visited the TRIGA type research reactor called "Thai Research Reactor-1/Modification 1 (TRR1-M1)" and RI production facilities at the Thailand Institute of Nuclear Technology (TINT) and learned about current activities being implemented at TINT.



Open Seminar

<sup>\*1</sup> Radioisotope (RI): An atom that emits radiation when changing from an active state to a stable state; its mass is different from, yet its chemical characteristics are identical to, other atoms of the same chemical element. (Also known as a radionuclide).

<sup>\*2</sup> AIPES: Association of Imaging Producers and Equipment Suppliers



## Neutron Activation Analysis Project

The aim of this project is to analyze samples that meet the needs of each member country, evaluate the results of sample analyses, and apply the results for social and economic benefits. Currently, analyses are conducted on geochemical samples, food samples, and environmental samples.

### Recent Achievements

In this project, member countries analyzed environmental samples (e.g., airborne dust) that have been collected in various Asian countries for the last eight years. Neutron activation analysis (NAA)\* was used in order to share information on the state of environmental pollution in the respective countries and, consequently, to reflect the results to environmental administration. In China and the Philippines, the results obtained by the NAA relative to atmospheric suspended dust have contributed to the formulation of measures for improving the environment.

With regards to the NAA of geochemical samples, studies have been conducted on exploring for mineral resources and investigating regional pollution issues. Food samples were selected based on the current conditions in the participating countries, and their elemental compositions were determined by NAA to investigate the food's levels of pollutants and nutrients. It is expected that the analytical results obtained for these samples will contribute to further evaluation and improvement of the environment and to evaluation of the safety of various foods.



Collecting samples of marine sediments



Preparation for food samples

This workshop was held as a result of the extension of 4th phase(JFY2011–2013) by one year. Representatives of all of the participating countries reported their progress on three sub-projects on geochemical samples, food samples, and environmental samples, as well as the establishment of linkages with appropriate end-users of NAA in their countries.

The participants also discussed their work plans and goals for the next phase beginning in 2015 and agreed to initiate two sub-projects targeted at 'Air Pollution – SPM(suspended particulate matter)' and 'Mineral Resources – Rare Earth Elements.'

At the open seminar, a presentation was given on the perspectives of nuclear applications in the Philippines. Participants from Philippines, Japan, and Australia also gave a report on advantages, success stories, and the roles of NAA.



Workshop



Open Seminar

### Outline of the Workshop

- Period: November 4-6, 2014
- Venue: Quezon (the Philippines)
- Number of participants: 15

(Australia, Bangladesh, Indonesia, Japan, Kazakhstan, ROK, Malaysia, Mongolia, the Philippines, Thailand and Vietnam)

\* Neutron activation analysis (NAA): A method to identify and quantify the elements in a sample by measuring the gamma rays emitted from the sample after irradiating it with neutrons.

# Nuclear Safety Strengthening

## Safety Management Systems for Nuclear Facilities Project

In order to ensure the safety of nuclear facilities, it is important to maintain a strong safety culture and integrated safety management systems. This requires that the organization which owns or operates a nuclear facility continuously maintains and develops its Safety Management System in order to assure nuclear and radiological safety. This project aims at enhancement of safety in nuclear facilities, by promoting understanding on safety management systems through exchanging experiences and knowledge, and by conducting peer review.<sup>\*1</sup> This project was initiated by Australia in JFY2009, replacing the former Nuclear Safety Culture (NSC) project.



Peer Review at HANARO, ROK

## Recent Achievements

Based on IAEA Safety Guide GS-G-3.1 “Application of the Management System for Facilities and Activities” and the achievement of the former NSC project, the tool for assessment of safety system has been developed ([http://www.fnca.mext.go.jp/english/sms/self\\_assessment\\_tool.pdf](http://www.fnca.mext.go.jp/english/sms/self_assessment_tool.pdf)). This tool is used for peer reviews and self-assessment of the safety management systems for nuclear facilities (mainly research reactors) in participating countries.

Four peer reviews using the present tool have been conducted to date, in Indonesia, Malaysia, Republic of Korea (ROK) and Bangladesh. A host country has to revise points to be improved (so called “Recommendations”) brought up during peer review, and to report on improvements achieved in the following workshop. As the result of the peer review in 2012, HANARO reactor of ROK Atomic Energy Institute (KAERI) achieved improvements, such as preparation of English leaflet for foreign visitors, adding more fire extinguishers, improved marking up of radiation areas, and fixing heavy objects as seismic countermeasure.



Leaflet for users and visitors to HANARO facilities

## Outline of the Workshop

- Period: May 19-23, 2014
- Venue: Dhaka (Bangladesh)
- Number of Participants: 23

(Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, the Philippines, Thailand and Vietnam)

At the Workshop, Australia, as the leader of the project, stated continuation of the project for the next two years. Representatives of Bangladesh reported on the outline of Bangladesh Atomic Energy Commission (BAEC) project to operate the country's first nuclear power plant by 2021, and the establishment of Bangladesh Atomic Energy Regulatory Authority (BAERA). Each country reported on latest update on safety management systems and its integration to existing system. Representative from Japan reported on application of the renewed regulation to research reactors after the accident of Fukushima Dai-ichi Nuclear Power Plant.

The Workshop was followed by a visit to BAEC's Atomic Energy Research Establishment (AERE) at Savar to conduct a peer review of the BAEC TRIGA Research Reactor (BTRR). The BTRR is mainly used for radioisotope production, neutron radiography, neutron activation analysis, neutron scattering, various researches and training. Peer review team visited BTRR (control room, reactor hall and pool top), Radioisotope production facilities, Health Physics and Radioactive Waste Management Unit (HPRWMU), Secondary Standard Dosimetry Laboratory (SSDL) and accelerator facilities. Based on the tool for assessment of safety system, question and answer session with AERE staffs were conducted. As the result of peer review, peer review team identified 11 “Good Practices”<sup>\*2</sup>, 21 “Comments”<sup>\*3</sup> and 14 “Recommendations”<sup>\*4</sup>. Out of these most of the items have no comments.



Workshop Participants

<sup>\*1</sup> Peer Review: A review of host facility by a team of experts from peer facilities who examine the host systems to identify good practices and areas for improvement.

<sup>\*2</sup> Good Practice: Features of SMS that enhancing safety and were worthy of recognition.

<sup>\*3</sup> Comment: Noteworthy matters relating to the topic.

<sup>\*4</sup> Recommendation: A matter where there was the potential for improvement that the facility should consider.



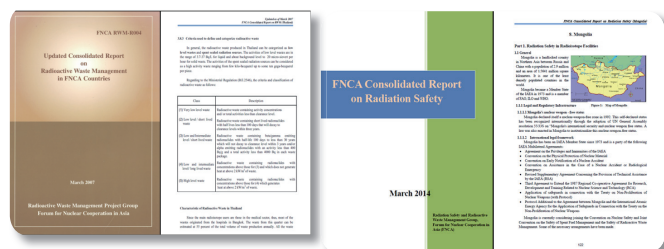
## Radiation Safety and Radioactive Waste Management Project

The aim of this project is to improve the safety in handling radiation and radioactive wastes in the Asian region, by sharing information and knowledge on radiation safety and radioactive waste management acquired through experience.

### Recent Achievements

The Consolidated Report on Radioactive Waste Management was first published in 2001 to organize and report on radioactive waste management in each country([http://www.fnca.mext.go.jp/english/rwm/e\\_consolidated\\_001.html](http://www.fnca.mext.go.jp/english/rwm/e_consolidated_001.html)). In 2007, the new edition was published([http://www.fnca.mext.go.jp/english/rwm/e\\_consolidated\\_004.html](http://www.fnca.mext.go.jp/english/rwm/e_consolidated_004.html)). In FY2011, the fourth phase (JFY2011-2013) was started, and the draft of the FNCA Consolidated Report on Radiation Safety was posted on the FNCA website to improve mutual understanding of radiation safety among member countries([http://www.fnca.mext.go.jp/rwm/FNCA\\_RS.pdf](http://www.fnca.mext.go.jp/rwm/FNCA_RS.pdf)). The Radiation Safety and Radioactive Waste Management Newsletter has also been published annually to deliver the latest information on radiation safety and radioactive waste management in each country. The newsletters are also made available on the FNCA website so that any persons interested in the project can have access to the information anytime from anywhere in the world([http://www.fnca.mext.go.jp/english/rwm/e\\_newsletter.html](http://www.fnca.mext.go.jp/english/rwm/e_newsletter.html)).

Some member countries have concrete plans for construction of nuclear power plants. Enhancement of knowledge of and information about radiation safety and protection, which are considered the basics of radiation use, has been emphasized as an urgent priority. In this regard, member countries now exchange information on nuclear/radiation emergency as well as data about past nuclear/radiation accidents, in order to encourage mutual understanding about radiation safety and radioactive waste management, as well as to promote a nuclear safety culture. This project also contributes to improvement of safety controls for radioactive waste at radioactive waste disposal facilities by dispatching Japanese experts and professionals to member countries in order to conduct site investigations and discussions.



Consolidated Report on Radioactive Waste Management Consolidated Report on Radiation Safety

## Outline of the Workshop

- Period: September 9-12, 2014
- Venue: Astana (Kazakhstan)
- Number of Participants: 15

(Australia, Bangladesh, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, the Philippines, Thailand and Vietnam)

At this workshop, each participating country gave a report on nuclear/radiological emergency preparedness and response, detailing the regulatory framework, zonation, emergency classification, on-site and off-site response, local government preparedness, training and education of personnel, and radiation monitoring plans. A discussion was held on the content and schedule for a consolidated report on nuclear and radiation emergency preparedness and response, which is expected to be completed during 5th phase starting in 2014 (JFY2014-2016).



Workshop

Participants also discussed: 1) radiation safety issues in uranium mining, 2) challenges in RS&RWM in RI facilities/nuclear power plant, 3) plans for NPP introduction, and 4) status and plans for low level waste disposal facilities/long term storage facilities. Japan explained a nuclear related law, Near Surface Disposal Method (Trench Disposal<sup>\*1</sup> and Pit Disposal<sup>\*2</sup>), current status of radioisotope waste managed by the Japan Radioisotope Association, and environmental remediation of the mill tailings pond at the Ningyo-toge Mine.



Workshop Participants

An open seminar on 'Radiation Protection in Nuclear and Radiation Facilities' was held at Nazarbayev University on 11 September. After lectures on the basics of radiation protection, a panel discussion was conducted with participation by the Deputy Chairman, Committee of Safety in Power and Nuclear Industry of the Republic of Kazakhstan.

<sup>\*1</sup> Trench Disposal: Bury, without artificial structures, in underground sites less than 50m in depth.  
<sup>\*2</sup> Pit Disposal: Bury within artificial structures in underground sites less than 50m in depth.

# Nuclear Infrastructure Strengthening

## Human Resources Development Project

Human resources should serve as an infrastructure for nuclear application. Japan—as a country that utilizes nuclear energy for electric power generation and R&D, and as a country that experienced a major nuclear power plant accident—is engaged in supporting human resources development (HRD) for safer and appropriate nuclear applications in Asian countries through this project. Specifically, the participants share knowledge and experience during the workshop and seek effective HRD strategies and international cooperation. The project organizes the Asian Nuclear Training and Education Program (ANTEP)<sup>\*1</sup>, an online database, to collect and share information on the status of HRD and current international cooperation, and seeks measures for mutual cooperation.



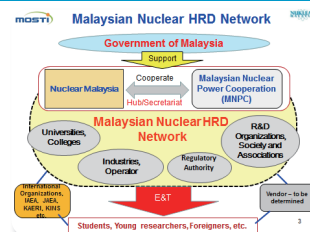
ANTEP Website

(<http://www.fnca.mext.go.jp/english/hrd/antep/>)

## Recent Achievements

Since 2012, member countries have been recommended to work on the development of a national HRD network and designation of a national focal point (a single contact point for international HRD cooperation). All member countries have been actively engaged in these activities. Japan, Bangladesh, Malaysia, Thailand, and Vietnam have succeeded in establishing a national network.

Information for the ANTEP has been collected by conducting an annual survey on the HRD needs of each country, as well as on HRD programs that a country may have available to provide to other countries. A total of 101 needs and 104 programs were collected in 2014. The results of the survey were reflected in the research themes of the Nuclear Researchers Exchange Program (NREP)<sup>\*2</sup> administered by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The needs and program were met through ANTEP between Japan and member countries, as well as between member countries such as Indonesia and Malaysia.



Example of the Nuclear HRD Network in Malaysia

## Outline of the Workshop

- Period: July 2-4, 2014
- Venue: Ulaanbaatar (Mongolia)
- Number of Participants: 18

(Bangladesh, China, Indonesia, Japan, Kazakhstan, ROK, Malaysia, Mongolia, the Philippines, Thailand and Vietnam)

The country reports included such topics as national policies for nuclear HRD in each country and training of nuclear power experts and nuclear communicators. Reports were also made to update the status of establishment of a national HRD network and the progress in designating a single contact point for international HRD cooperation, the status of MEXT's programs supporting Asian countries including FNCA member countries, and the results of the ANTEP survey. An agreement was reached to hold the workshop on HRD to exchange views and information on HRD policy and implementation plan every three years, with the participation of high level officials responsible for the national HRD policy, and to hold HRD workshops in the years between these high level officials' meetings to focus on specific important topics and relevant HRD policies. Training programs for nuclear communicators and small and medium (module) reactors were proposed as topics to discuss at these workshops.

The open seminar held on the last day of the workshop was attended by about 40 people in the field. The themes of the seminar lectures included organizational structure and status for uranium mining and introduction of NPP in Mongolia, nuclear education in Japanese universities, nuclear HRD strategy in China and Indonesia, and the current status of nuclear and radiation application technology in ROK and Malaysia.

After the open seminar, a technical visit was conducted at the State Central Veterinary Institute.



Workshop Participants

<sup>\*1</sup> ANTEP: A database developed for matching the needs and existing HRD programs in order to facilitate effective and efficient HRD activities in FNCA member countries.

<sup>\*2</sup> NREP: A project led by the MEXT to invite nuclear researchers in Asia to Japanese research institutes and universities. Its plan is determined in reference to the survey results of ANTEP.



## Nuclear Security and Safeguards

### Project

Promotion of peaceful use of nuclear power in Asian countries requires the improvement and maintenance of nuclear safety, nuclear security<sup>\*1</sup> and safeguards<sup>\*2</sup>. The aim of this project is to enhance nuclear security and safeguards in the participating countries by encouraging a shared awareness of the importance of nuclear security and safeguards, sharing information on policies and knowledge, and promoting cooperation in developing human resources.

### Recent Achievements

FNCA member countries have been improving knowledge and awareness of the importance of nuclear security and safeguards through information exchange on implementation of nuclear security and safeguards in each country in combination with workshops. An open seminar was held at the workshop in 2012, in conjunction with the Asia-Pacific Safeguards Network (APSN), which is a network of safeguard-related organizations in the Asia-Pacific region, led by Australia. The goal was to share experiences in the implementation of the IAEA Additional Protocol (AP)<sup>\*3</sup>.

Information on implementation of nuclear security and safeguards, as well as information on the regulatory authorities for nuclear 3S (Safety, Safeguards, and Security), has been shared through the FNCA website. Based on the Chair's Statement at the 14th FNCA Ministerial Level Meeting in December 2013, member countries have been sharing information on initiatives and best practices for the development of nuclear security culture through the FNCA website with the aim of a further development of nuclear security culture in the Asian region.



Information Sharing on the FNCA Website

Nuclear Security Culture Development Japan				
Initiatives or Activities	Status/ Facility	Target	Contents	Notes
Development of FNCA	State	International operators	Contributing to strengthening nuclear security by deepening education and training	Implemented Dec 2010
Nuclear security culture workshop	State	International operators	Co-hosted the 1st workshop for participants from Asia	Nov 2012
Regulatory requirements for promoting nuclear security culture	State	Domestic operators	Operators are required to have a system to promote nuclear security culture within the organization	Nov 2014
Nuclear security promotion video	State	International operators	NSA introduced promotion video as an international common tool and provided the video to operators as a means of facility-level nuclear security culture education	May 2014
ICSN workshop	ICSN	Domestic operators	Discussions using past nuclear security and promotion of collaboration among member countries in Japan	• Held annually in Tokyo from 2011 • Last President-based workshop for discussion
Nuclear security culture education	Facilities	Facility employees	Provide nuclear security education for facility employees	• Started from 2011 • Started from each facility

Template of Nuclear Security Culture Development (Japan)

### Outline of the Workshop

■ Period: November 5-7, 2014

■ Venue: Daejeon (Republic of Korea (ROK))

■ Number of Participants: 24

(Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, ROK, Malaysia, Mongolia, the Philippines, Thailand, Vietnam and observer from IAEA)

In addition to the participants from 12 FNCA member countries, one representative from IAEA participated in the workshop. Each representative gave a presentation on the progress of activities for nuclear security and safeguards, including activities related to nuclear security culture and capacity building, in the respective countries. The subsequent individual sessions included reports and discussions on the IAEA Symposium on International Safeguards, held in Vienna in October 2014, the Nuclear Security Summit, held in The Hague in March 2014, and efforts promoting nuclear security culture in member countries. Round-table discussions were then held on the domestic legal framework for safeguards, information security, and the role of COEs (centers of excellence) for human resources development.

The following has been suggested as action plans for 2015.

- To update the summary of country reports on nuclear security and safeguards, tabulate the information on nuclear security culture, and tabulate the information on regulatory authorities for nuclear 3S on the FNCA websites
- To report on current/planned regulations for protecting confidential information
- To have a continuous discussion on information security and at the next workshop
- To co-host of an open seminar on nuclear security culture and safeguards awareness with APSN, for collaboration with APSN (Proposal)

The participants visited the International Nuclear Nonproliferation and Security Academy (INSA) of the Korean Institute of Nuclear Nonproliferation and Control (KINAC), and toured the facilities including the External Physical Protection Training & Test Facility and its Central Alarm Station.



Workshop

\*1 Nuclear security: Measures taken to prevent, detect and response to theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear materials and radioactive sources.

\*2 Safeguards: Measures taken to ensure that nuclear materials are used only for peaceful purposes and not for nuclear weapons, or other nuclear explosive devices.

\*3 Additional Protocol: An agreement concluded between a country and the IAEA, complementary to the country's safeguards agreement with the IAEA.

## The 15th FNCA Coordinators Meeting (March 11-12, 2014, Tokyo)



Meeting Participants

The 15th FNCA Coordinators Meeting was held on March 11-12, 2014, in Tokyo, Japan, hosted by the Cabinet Office of Japan (CAO) and the Japan Atomic Energy Commission (JAEC), and co-hosted by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. The Meeting was attended by delegates from 12 member countries: Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, Republic of Korea (ROK), Malaysia, Mongolia, the Philippines, Thailand, Vietnam, and the IAEA/RCA (Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology).

### ●FNCA Project Activities

Each Project Leader reported on the ongoing 10 projects. Each of them reviewed the activities and presented the future plan. Challenges of each project and possible synergies among the projects were also discussed.

### ● Review and Plan of Study Panel on Infrastructure Development for Nuclear Power

The result of the FNCA 5th Panel Meeting held in August 2013 was reported. The meeting agreed to discuss SMR, the role of TSO (Technical Support Organization) and research institutes, the strategy of stakeholder involvement for nuclear power programs, the status of the Fukushima Daiichi Nuclear Power Station, and Emergency Preparedness and Response at the next Study Panel in Vietnam.

### ●Collaboration with IAEA/RCA

It was confirmed that cooperation between IAEA/RCA and FNCA in the areas of radiation processing, radiation oncology, and mutation breeding works well, and should be continued.

### ●Follow-up on Recommendations of the 14th Ministerial Level Meeting

Presentations and discussions were made on nuclear security culture development, practical use of the radiation utilization projects and cooperation on HRD among FNCA member countries. During the session, the importance of involving top management in nuclear security culture development was recognized and the needs for strategy to facilitate technology transfer to end users were emphasized.

The member countries were encouraged to dispatch senior officials to the HRD Project workshop.

### ●Future Policy on FNCA Activities

Dr Machi gave a summary of the 10 FNCA projects. FNCA Coordinators also made comments on Dr Machi's input. The meeting agreed to continue seven projects beyond JFY2013.

The major points of Conclusion and Recommendations that were agreed by the Meeting are as follows.

### ●Conclusion and Recommendations

- The meeting fully recognized the importance of establishing nuclear security culture and that the leadership of government, and executive management of all nuclear related organizations, is the key for the establishment of a strong culture. To expedite practical application of the radiation applications projects, the meeting agreed the Coordinators should work with the respective project leaders to transfer the achievements to end-users, including setting up a network of nuclear research institutes.
- The meeting agreed the HRD Workshop, with participation by senior officials, should discuss the strategy of specific HRD programs such as (1) training nuclear communicators and engaging social scientists for better stakeholder involvement, (2) filling the knowledge gap between the younger and more experienced workforce, and (3) training nuclear power experts.
- The meeting recommended that FNCA website should be more fully utilized and updated with information on FNCA activities.
- The meeting recommended that FNCA website should be more fully utilized and updated with information on FNCA activities.



A Scene of the Meeting



## The 6th Panel Meeting of “Study Panel on the Approaches toward Infrastructure Development for Nuclear Power” (August 26 - 27, 2014, Hanoi)



A Scene of the Meeting

The 6th Meeting of "Study Panel on the Approaches toward Infrastructure Development for Nuclear Power" was held on August 26-27, 2014 in Hanoi, Vietnam, co-hosted by Cabinet Office (CAO), Japan Atomic Energy Commission (JAEC) and Vietnam Atomic Energy Institute (VINATOM). The Meeting was attended by delegates from 10 member countries: China, Indonesia, Japan, Kazakhstan, Republic of Korea (ROK), Malaysia, Mongolia, the Philippines, Thailand, Vietnam and IAEA via web conference.

### ●Vietnam's Nuclear Power Development

President of VINATOM delivered a special presentation on Vietnam's nuclear power plant development, current status and future plan.

### ●Update of the Accident at TEPCO's Fukushima Daiichi Nuclear Power Station

Ministry of Economy, Trade and Industry (METI) of Japan reported on the current status of TEPCO's Fukushima Daiichi Nuclear Power Station and their efforts for remediation. Some works are now in progress under the mid-and-long term roadmap towards the decommissioning, and fuel removal from the spent fuel pool at Unit 4 will be accomplished around the end of 2014.

### ●The New Strategic Energy Plan of Japan

The new strategic energy plan of Japan was presented by METI. It introduced the new plan authorized by the Cabinet in April 11, 2014, which has positioned nuclear power as important base-load power source as well as low carbon and quasi-domestic energy source and also stated clearly that seeking the understanding of relevant municipalities and the international community will promote the nuclear fuel cycle policy.

### ●Technical Support Organization (TSO)

Japan gave a presentation of a history of TSO in the country, tracing a path from the start of nuclear energy development in 1954. Indonesia reported on the efforts and challenges to build TSO in the country. ROK spoke on the outline of their TSO. The meeting discussed TSO's mission to regain public trust in nuclear safety, TSO and stakeholders and TSO's organizational independence.

### ●Small Modular Reactors (SMR)

IAEA reported on small modular reactors in terms of safety, economy, waste management and non-proliferation. China and Japan respectively introduced SMR design features, potential advantages and challenges in their own countries. ROK made a presentation on SMART (System-integrated modular advanced reactor). The discussion on SMR was made focusing on SMR technologies from the aspects of safety, economy, and radioactive waste management.

### ●Emergency Preparedness and Response (EPR)

Indonesia reported on building regional networks and overview of recent activities in the world. Vietnam introduced their approach to developing a nuclear emergency preparedness and expressed a request for assistance and support from IAEA as well as developed countries to make a proposal to meet practical demand of Nuclear and Radiological Emergency Preparedness & Response in Vietnam. Japan delivered a presentation on dose estimations for Fukushima residents after the Fukushima Daiichi Nuclear Power Station accident and gave an explanation on need for radiation emergency medical preparedness. The meeting discussed decision making process for evacuation and a long term medical care such as thyroid check for children and psychogenetic care.

### ●Stakeholder Involvement

Japan introduced differences in local stakeholder involvement among France, UK and Japan and a success story of stakeholder involvement in nuclear power projects in Fukui Prefecture as a model case. Kazakhstan presented their experiences and activities to advance the local community's understanding of uranium mining facilities. The meeting discussed institutionalization of stakeholder involvement by law and dissemination of nuclear information to the public.

### ●Discussion on the Future Study Panel

Japan proposed the 4th phase proposed with the following objective and scheme: 1) 4th phase should play a role of the platform for exchanging views and sharing experiences on the national policy and international cooperation for nuclear energy development (nuclear power and nuclear application), 2) Senior level officials and FNCA Coordinators are the expected participants and 3) Study Panel and Coordinator Meeting will take place for three days back to back. The proposals will be continuously discussed and concluded at the upcoming Ministerial Level Meeting.



## Message from Dr. Sueo Machi, FNCA Coordinator of Japan

### 15th Ministerial Level Meeting in Sydney

The 15th FNCA Ministerial Level Meeting was held in Sydney 19 November, 2014 co-chaired by The Hon. Mr. Ian MACFARLANE, Minister for Industry, Australia, and Mr. Nobuyasu ABE, Vice Chairman, JAEC.

Minister, Mr. Ian MACFARLANE stressed by the opening speech that the FNCA started in 2000 is successfully benefiting member countries through the partnership and celebrating 15th anniversary at this Ministerial Level Meeting. He underlined that Australia is contributing to the development of nuclear science and technology by using the new multi-purpose research reactor, OPAL, and supplying uranium for nuclear power.

### Successful FNCA Projects on Radiation Application

The project on protocol studies of radiation therapy have achieved high survival rate of 68% for uterine cervix cancer patients 5 years after treatment and 80% for head/neck cancer patients 3 years after treatment. These protocol should be disseminated as much as possible.

The project on biofertilizer achieved to prove the longer shelf life and better quality of biofertilizer produced by using carrier sterilized by radiation than that sterilized by high temperature steam. In 2013-14 the technology developed by the project is commercially used in Malaysia and the Philippines.

In the project on radiation processing of natural polymers, significant effect of the oligo-chitosan has been proven for crop yield increase and enhanced crop disease resistance for a variety of crops, including rice, red chili, tomato, potato, carrot, cucumber, cyclamen in the field tests.

Commercial application of the product has been achieved in Vietnam, Malaysia, Thailand and Japan. In Indonesia oligo-chitosan is in the process of registration as PGP for the commercialization.

### New FNCA Study Panel on Nuclear Power

New phase 4 of the Study Panel on nuclear energy starts from JFY 2015 with new scope and objectives. The agenda on ① nuclear power policy for the energy security and the reduction of GHG emission in connection with the COP-21 and/or ② policy/priority and international cooperation for the promotion of nuclear application for sustainable development may be topics of the first meeting.

### Enhancement of Infrastructure Development

For strengthen nuclear security, Japan and Korea are supporting the member countries to build the nuclear security culture and training personnel by the JAEA ISCN and KINAC under the project.

Project on Safety Management System of Nuclear Facilities in the peer review was carried out in Bangladesh in JFY 2014, and BAEC has improved the safety management by following the recommendation of peer review.

The FNCA activities in JFY 2015 will be implemented through the active cooperation of member countries with partnership following the resolution adapted by the 15th Ministerial Level Meeting and conclusion of 16th Coordinators Meeting in March 2015.

# Outcomes of FNCA Activities

### Manuals • Guidelines • Reports

< Radiation Utilization Development >

Mutation Breeding Manual    Achievement Report for Research on Mutation Breeding Project    Biofertilizer Manual

FNCA Guideline on Development of Hydrogel and Oligosaccharides by Radiation Processing    Handbook in Brachytherapy Physics    Radiation Therapy of Stage IIIB Cervical Cancer for Asians    Vol. 1 Quantification of beneficial microbes in biofertilizer

< Nuclear Safety Strengthening >

FNCA Safety Management System Project Tool for Self-Assessment/Peer Review    Task Group Reports and Consolidated Reports on Radioactive Waste Management/Radiation Safety

### Commercialized Products

Biofertilizer Products (Malaysia)    Oligo-Chitosan Plant Growth Promoter (Vietnam)    Oligo-Chitosan Animal Feed Additive (China)    Beauty Hydro-gel Facial Mask (Malaysia)

### Brochures • Newsletters

FNCA Brochure    FNCA Newsletter    FNCA Biofertilizer Newsletter    FNCA Radiation Safety & Radioactive Waste Management Newsletter

### Enrichment of Websites

Introduction & Reports for FNCA Activities on FNCA Website    Link with ANTEP Website    Information Sharing on the FNCA Website for Nuclear Security Culture Development



## FNCA Activities in JFY 2014

Activity		Schedule	Host Country
The 15th Ministerial Level Meeting		November 19 , 2014	Australia
The 6th Panel Meeting of “Study Panel on the Approaches toward Infrastructure Development for Nuclear Power”		August 26-27, 2014	Vietnam
The 16th Coordinators Meeting		March 4-5, 2015	Japan
Radiation Utilization Development	Mutation Breeding Workshop	January 27-30, 2015	China
	Biofertilizer Workshop	November 24-27, 2014	Malaysia
	Electron Accelerator Application Workshop	February 9–12, 2015	Indonesia
	Radiation Oncology Workshop	November 4-7, 2014	Japan
Research Reactor Utilization Development	Research Reactor Network Workshop	October 14-16, 2014	Thailand
	Neutron Activation Analysis Workshop	November 4-6, 2014	the Philippines
Nuclear Safety Strengthening	Safety Management Systems for Nuclear Facilities Workshop	May 19-23, 2014	Bangladesh
	Radiation Safety and Radioactive Waste Management Workshop	September 9-12 , 2014	Kazakhstan
Nuclear Infrastructure Strengthening	Human Resources Development Workshop	July 2-4, 2014	Mongolia
	Nuclear Security and Safeguards Workshop	November 5-7, 2014	Korea

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

## Name

FNCA : Forum for Nuclear Cooperation in Asia

## Participating Nations

Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, Korea, Malaysia, Mongolia, The Philippines, Thailand and Vietnam, IAEA (Observer)

### Ministerial-Level Meeting

The ministerial-level representatives of each country holding jurisdiction over nuclear activities discuss cooperation measures and nuclear related policies. On the day before the ministerial-level meeting, the senior administrative officials meeting is to be held.

### Coordinators Meeting

The Coordinators who are selected as a representative by each nation discuss several issues including introduction revision & abolishment, coordination and evaluation of cooperative projects.

\*For further information: FNCA Website: <http://www.fnca.mext.go.jp/english/index.html>

### Panel Meeting

To examine & evaluate the role of nuclear energy, and also study problems related to the introduction of nuclear power generation. A new study panel on the Approaches toward Infrastructure Development for Nuclear Power started in 2009.

### Project

Each FNCA participating nation holds workshops through post rotation to discuss activity programs.

## The FNCA Framework



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This Newsletter is issued by Nuclear Safety Research Association (NSRA) under the contract with the Ministry of Education, Culture, Sports, Science and Technology (MEXT)