Annex 4

Summary of Open Seminar
- Countermeasures for Nuclear/Radiological Emergency at Nuclear Facilities -

Date: 18th November, 2015,
Venue: National Nuclear Energy Agency(BATAN)

<u>Presentation</u>

1) Special Lecture1: Overview and Recent Progress of FNCA (Prof.Tomoaki Wada, Japan Foundation of Public Communication on Science and Technology)

FNCA, which started in 1990, is a Japan-led cooperation framework for the peaceful use of nuclear technology in Asia.

This cooperation consists of FNCA meetings and the project activities with the participation of Australia, Bangladesh, China, Indonesia, Kazakhstan, Korea, Malaysia, Mongolia, the Philippines, Thailand and Vietnam.

Nuclear power is an important base-load power source because of a low-carbon and quasi-domestic energy source. The advantage of nuclear power includes the stability of energy supply-demand structures on the major premise of ensuring safety from the perspective of superiority in the stability of energy supplies and efficiencies, low and stable operational costs, and free from GHG emissions during operation.

Many remarkable outcomes have been brought by the 10 ongoing FNCA projects. In Indonesia, for example, under the Electron Accelerator Project, the growth of shallots were promoted by using Oligochitosan and SWA.

FNCA Activities has an effective connection with two MEXT Training Programs on Nuclear Energy and Radiation Utilization: Nuclear Researchers Training Program and Instructors Training Program.

2) Lecture 1: Countermeasures for Nuclear/Radiological Emergency at Nuclear Facilities in Indonesia (Mr Adi Wijayanto BATAN)

Countermeasures for radiation emergency at nuclear facilities in Indonesia refer to Emergency Preparedness and Responses Program. One of the nuclear facilities in Indonesia is Transfer Channel-Interim Storage for Spent Fuel (TC-ISSF) at Center for Radioactive Waste Technology (PTLR-BATAN). Based on hazards assessment, TC-ISSF is classified in emergency preparedness category I. The aim of nuclear emergency preparedness and responses program for TC-ISSF is to provide a guidance for taking action to reach the goal of preparedness and responses for a nuclear emergency in TC-ISSF facility. This program is integrated with emergency preparedness and response program of Serpong Nuclear Area organized by Center for Informatics and Nuclear Strategic Zone Utilization (PPIKSN-BATAN) to anticipate the escalation of radiological impact. Emergency Preparedness and Responses TC-ISSF Team is equipped by some facilities and equipment e.g:Alarm, Handy talky (HT), Closed Circuit Television (CCTV) camera, Human Machine Interface, Parameter Conductivity, pH, etc.& Radmon (Real-time Radiation Monitoring System), Radioactive Handling, Personal Protected Equipment (PPE) and Rescue Tools, Fire Extinguishers, Dosimeter and Decontamination Kits, Surface, Floor and Air Contamination Monitor, Crisis Centre Room. Emergency Preparedness and Responses TC-ISSF Team also has procedures and work instructions to countermeasureemergency preparedness and responses inTC-ISSF.Identification, Reporting and Activation, Mitigation, Protection for prevention radiation emergency will be done after Emergency Preparedness and Responses TC-ISSF Team is activated.

3) Lecture2: Countermeasures for Nuclear/Radiological Emergency at Nuclear Facilities in Bangladesh (Dr. M. Moinul Islam, Bangladesh Atomic Energy Commission)

Presentation highlighted the Policy, Regulatory Framework and present structure of Bangladesh Atomic Energy Regulatory Authority (BAERA). The Control of occupational radiation exposure and the basic responsibilities, infrastructure requirement for the establishment of emergency management system for radiation and nuclear facilities are discussed in the report. The presentation also provided details on national emergency response plan and for nuclear facility at Atomic Energy Research Establishment as well.

4) Lecture3: Countermeasures for Nuclear/Radiological Emergency at Nuclear Facilities in Kazakhstan (Mr Yevgeniy Tur, National Nuclear Center of the Republic of Kazakhstan)

In the field of nuclear and radiological emergency preparedness and response, regulatory framework of Kazakhstan is represented by four-level structure of documents: 1) laws "On Atomic Energy Use", "On Radiation Safety of Population" and "On Civil Defense"; 2) resolutions of the Government, such as "National plan for response to nuclear and radiological accidents"; 3) rules and regulations approved by central government authorities, such as hygienic norm "Sanitary-epidemiological requirements to radiation safety assurance"; 4) standards of enterprises, guidelines, typical instructions, such as plans for emergency measures.

In Kazakhstan's regulatory framework there are following types of countermeasures: sheltering, iodine prophylaxis, evacuation, limitation of consumption of contaminated food and drinking water, relocation. These countermeasures are divided into urgent and long-term, depending on stage of accident.

There are criteria for taking urgent decisions at the initial stage of radiation accident, and criteria for decisions on restriction of contaminated food and water consumption in the first year after accident.

In the regulatory documents of Kazakhstan, zoning differs depending on various stages of the life cycle of a nuclear facility and at the various stages of accident. At the design stage of a facility where there is a probability of accidents with a large off-site release, territory is divided on three emergency planning areas, depending on distance of these areas from the facility: Preventive protective action zone, Urgent protective action zone, and Long-term protective action zone. In the early and intermediate stages of radiation accident, dimensions and forms of these zones are adjusted based on monitoring and forecast of radiation conditions, and after that, measures are implemented to reduce the exposure levels of the population.

There are also zoning for remediation stage of radiation accident: 1) radiation control area (from 1 mSv to 5 mSv); 2) restricted area of residence of population (from 5 mSv to 20 mSv); 3) resettlement zone (from 20 mSv to 50 mSv); 4) exclusion zone (more than 50 mSv). Decisions on protective measures on this stage of radiation accident are taken depending on radiological situation and specific socio-economic conditions.

5) Lecture4: Countermeasures in case of Nuclear or Radiological Emergency in Malaysia (Dr.Wan Saffiey Bin Wan Abdullah, Malaysian Nuclear Agency)

In the event of a radiological emergency in Malaysia, the Ministry of Health (MOH) will be responsible for providing appropriate medical care to radiological victims both onsite and in the hospital. The MOH will also responsible for monitoring long-term health problems that could arise as a result of complications from the radiological event. The MOH will be able to mobilize the necessary personnel, laboratory and radiological resources for the purpose of deployment during emergencies. According to Prime Minister's Directive 20 of the National Security Council, the leading technical agency for any radiation emergency will be the Atomic Energy Licensing Board (AELB). The MOH will be responsible for providing medical care to the victims while the control of environmental spread of radioactive material, assessment of its impact on the environment, food and water supplies, properties and the initiation of protective measures for these items will be the responsibility of the AELB.

The nuclear emergency that can take place in Malaysia only from 1MW research reactor at the Malaysia Nuclear Agency, others involving radiological emergency may occur at hospital, factories, workplace and research center. Radiation from extraneous source and the fall out of scrapper from the nuclear satellite could also another possibility. The MOH both at the periphery and central levels will be involved in the process of notification and response to radiation accidents. A Radiation Emergency Treatment Committee (RETCOM) is to be formed at Hospital Kuala Lumpur (HKL) in preparation for radiation emergencies. HKL is the designated National Radiation Treatment Centre. Therefore it requires Emergency Radiation Treatment Area (ERTA), equipped with facilities for the treatment of victims from radiation emergencies. Investigation of the exposed victim by cytogenetic study and internal contamination analysis will be performed if there is any requirement. The Malaysian Emergency Co-ordination Centre (MECC) at HKL may dispatch the usual nearest ambulance to the site upon receipt of emergency call, radiological triage may be used if multiple casualties are involved; temporary work area for first aid treatment; medical physical procedures and triage examinations need to be established. Depending on the situation the contamination of a patient will be determined at the field, on the way to a medical facility, or at the hospital. Mass casualty incidents are managed according to Directive 20 of National Security Council. Three zoning areas of red, yellow and green will be will be established. Mass Casualty Incident Management Involving Radiation in Radiation Incident Involving Mass Casualty, contaminated patients will be treated first by the HAZMAT team from Fire and Rescue before being delivered to the casualty collecting area (cold zone). Classify patient radiation injuries before deciding to activate radiation plan based on information obtained will be done at offsite. Special Measures for dealing with waste, surgical procedure dealing with death of a contaminated person will also establish.

6) Lecture5: Radiological Accident in Thailand and Lessons to Be Learned
(Ms. Nanthavan Ya-anant, Thailand Institute of Nuclear Technology)

A serious radiological accident occurred in Samut Prakarn, Thailand, in late January and early February 2000 when a disused 60Co teletherapy head was partially dismantled, taken from an unsecured storage location and sold as scrap metal. Individuals who took the housing apart and later transported the device to a junkyard were exposed to radiation from the source. At the junkyard the device was further disassembled and the unrecognized source fell out, exposing workers there. The accident came to the attention of the relevant national authority when physicians who examined several individuals suspected the possibility of radiation exposure from an unsecured source and reported this suspicion. The OAEP emergency response team took an effort to locate the source, a fluorescent screen was used. An emergency response team personnel innovated a means of retrieving it by attaching an electromagnet to a length of bamboo. On 20 February 2000 at 00:20, the source, which had been estimated to be about 4 cm long and 2.5 cm in diameter, was retrieved. Finally, they confirmed that the source activity was estimated at roughly 15.7 TBq (425 Ci). The source was transported to safe storage at the OAEP. Altogether, ten people received high doses from the source. Three of those people, all workers at the junkyard, died within two months of the accident as a consequence of their exposure.

7) Lecture6: Countermeasures under Fukushima Daiichi NPP Accident (Prof. Toshiso Kosako, The University of Tokyo)

An extraordinary large external event occurred on 11 March, 2011. The earthquake and Tsunami led to station blackout of Fukuhima Daiichi NPP, and consequently core melt down. An off-site center was set up about 5 km away from the NPP for government, local government, NPP, and Media. However, due to radiation plume and high radiation dose, it was moved to Fukushima prefectural capital, which is 100 km away from the NPP. Japanese regulation defines dose limitation for radiation workers as 100 mSv. On March 26, Industrial Minister declared a new vale of 250 mSv for emergency worker's dose limit.

Regarding Radioactive waste management arisen from Fukushima Dai-ichi Nuclear Power Plant, there were some challenges such as Debris, damaged fuel, and structural materials.

The issues of the radioactive waste management from the environment includes fallout (dry & wet deposition), Decontamination (Clean up), Soil, and Organic substance. There are 12 candidates for intermediate storage in Fukushima Prefecture with volume of 28 M m^3. The schedule for construction has started in 2015. However, a discussion still remains on intermediate storage and final disposal.

Regarding decontamination technology, heat treatment, classification, and chemical treatment were applied for soil. Elution is applied for sewage sludge. Cutting ablation, washing(nano-bubble, ozone), high pressure washing (280Mpa), and grinding ablation were used for the decontamination of park, road and buildings.

Triturating washing and separation by dry ice were used for rubble.
It is important to recognize the advantages of nuclear power and ensure the safety culture.

8) Special Lecture2: Human Resource Development Programs of Japan for Nuclear/Radiological Emergency (Mr. Hiroyuki Murakami, Institute of Radiation Measurements)

The NPP accident in Fukushima, 2011 made us all realize that human capital for nuclear emergency situation is very much important in carrying out the appropriate actions against severe radiation hazardous conditions. In Japan, Japan Nuclear Human Resource Development Network promotes some activities for training emergency experts and improving their abilities for various emergency scenes. Many organizations participating in the Network, such as JAEA, NIRS and electric power companies, are now conducting various types of education and training programs. Risk communication course and international course for Asian countries are also conducted.