Attachment 3

Session Summary of
FNCA 2012 Workshop on
Radiation Safety and Radioactive Waste Management

Session I: Country Report Presentation
- Public Exposure -Normal and Emergency Situation/Updates of Consolidated Report on Radiation Safety drafted in 2010-

1) Australia

Ms. Lynn Tan, Project Transition Leader, Waste Projects and Strategic Planning, Australian Nuclear Science and Technology Organisation explained some updates on Australia's country report. A few updates to its Radiation Publication Series publications. ARPANSA's plan to expand the Australian National Radiation Dose Register (ANRDR) to all radiological-exposed workers, not just limited to the current uranium mining and milling workers. Planned expansion to mineral sands processing, commonwealth license holder, medical, research and industry sectors. ARPANSA together with Government Skills Australia is establishing a nationally consistent training & skills recognition system that is competency based. The aim is to harmonise radiation safety training across Australia through the involvement of mining, industry, universities and States and Territories regulators. ANSTO is recognised across Australia to be the lead advisor on radiation safety issues and leader in radiation safety training and our consultancy services is available to stakeholders outside of Australia.

She also delivered a presentation on public exposure-Normal and Emergency Situations, including report on Fukushima. ANSTO conducts a range of environmental monitoring to assess the impact of its activity on the local community taking into considerations all potential pathways (air, water and land). It is found that ANSTO operations contribute much less radioactivity to the environment than is naturally present. ARPANSA conducts island-wide monitoring, hosting the 3rd largest CTBTO monitoring stations in the world. Additional sampling and monitoring was undertaken by the regulatory body after the Fukushima Dai-ichi nuclear power plant accident. The findings were published and it was assessed that the impact on the health of people living in Australia due to the accident is negligible.

2) Bangladesh

Dr. M. Moinul Islam, Principal Scientific Officer of Health Physics & Radioactive Waste Management Unit, Bangladesh Atomic Energy Commission (BAEC) described Bangladesh Atomic Energy Commission (BAEC) structure, existing manpower and major R and D infrastructure of BAEC. The new act called BAER Act-2012 also introduced in the presentation. The current situation regarding education and training in radiation safety also been

addressed.

3) China

Mr. Cheng Qifu, Deputy Director, Division of Health, Safety and Environmental Protection Department of Safety and Environmental Protection, China National Nuclear Corporation (CNNC) presented progress of radiation safety and radioactive waste management in China. The presentation described the status and plan of China's nuclear energy development since the Fukushima Daiichi nuclear disaster in 2011, and some progresses of radiation safety and radioactive waste management in recent years. The control measures of public exposure are mainly introduced, include dose limit for public, control of radioactive effluents discharge into environment, and radiation environment monitoring.

4) Indonesia

Mr. Suryantoro, Head of Radwaste Treatment Division, Radioactive Waste Technology Center National Nuclear Energy Agency of Indonesia (BATAN) delivered a talk on Public and Environmental Radiological Protection. The Nuclear Energy Regulatory Agency (BAPETEN/NERA) is the only regulatory authority in Indonesia with necessary empowerment and QA system to ensure the effectiveness of the legal infrastructure. The chairman of NERA issues regulations in the form of BCR (BAPETEN Chairman Regulation).Responsibilities are established. There are several regulations covering public and environmental radiological protection.

5) Japan

Prof. Toshiso Kosako, Professor, Nuclear Professional School, Graduate School of Engineering, The University of Tokyo explained overview of Fukushima-Daiichi Nuclear Power Plant (Rehabilitation Stage after Accident), status of nuclear business (Nuclear Power Reactors, JAEA, etc.), and new oganization of radiation and nuclear safety (nuclear regulatory authority). On site issues include stability of damaged reactor core cooling, melted core fuel handling (technology development, remote handling, including robots), stabilization of radioactivity (gaseous waste, solid waste, liquid waste), radioactive wastes (melted core, intermediate storage, processing, final disposal). The means to prevent contaminated water flow as well as clean-up work of surrounding area were also described.

Ms. Emi Imaizumi, Nuclear Safety Research Association showed Japan's updates of consolidated report on radiation Safety. Nuclear Regulation Agency (NRA) was established in September 2012 and as an external organization of Ministry of Environment. Based on the lessons learned and suggestions from Japan and overseas as well, NRA is enhancing nuclear regulations, including reinforcement of countermeasures for major accidents, implementation of nuclear safety regulations based on latest knowledge, and introduction of a 40-year-limiting operation system.

6) Kazakhstan

Dr. Shayakhmet Shiganakov, Principal Scientific Fellow, National Nuclear Center of the Republic of Kazakhstan reported on current situation of radiation safety in Kazakhstan. Main factors forming nuclear and radiation situation in Kazakhstan were described. There are activities of National Atomic Company "Kazatomprom", National Nuclear Center and other enterprises. Basic technical parameters of research reactors, fast breeder reactor BN-350, others installations are described. The presentation includes short information concerning to the regulatory body of Kazakhstan, its structure and responsibilities also. List of main laws and regulations are listed.

7) Malaysia

Dr. Mohd Abd Wahab Bin Yusof, Manager/Senior Research Officer of Waste Technology Development Centre, Malaysian Nuclear Agency firstly explained the definition of public exposure in the Malaysian law. He also explained that legal framework such as laws and regulations, independent regulatory body and enforcement of laws shall be established to protect the members of public from radiation. Safety culture should also be stressed. The hierarchy legal system was also explicated. He also explained that it is very important to understand the basic principles of radiation protection to ensure the safety of public from exposure to radiation (justification, optimisation and dose limitation). Before radioactive is discharged into the environment, radiological impact assessment need to be done and all critical pathways and critical groups need to be determined to ensure exposure to the members of public is very minimum. It is also very important that the discharge of radioactive into the environment be controlled, monitored and shall below than clearance limit as stated in the regulations. Public entering supervised and controlled area is also needed to be controlled and monitored. Lastly he explained how important is radiological emergency plan where it shall be established, maintained and revised to protect radiation workers, members of the public and the environment.

8) Mongolia

Ms.Oyuntulkhuur Navaangalsan, Adviser to the Director General on Regulatory Affairs, Nuclear Energy Agency of Mongolia presented updates of status radiation safety and radioactive waste management in Mongolia. The radiation protection infrastructures including regulatory body, legal framework, emergency response and radioactive waste management of Mongolia included in the presentation. She also mentioned updates of public exposure control including food and environmental monitoring, control of scrap metal, orphan source and border control of detection of RAM. Future activities and priority areas for public exposure control for Mongolia also presented.

9) Philippines

Ms. Maria V. B. Palattao, Head of Regulation and Standard Development Section, Nuclear Regulatory Division, Philippine Nuclear Research Institute (PNRI) presented public exposure: normal and accident situations. She outlined various radiation facilities and sources that currently exists in the country. The legislative and regulatory framework that ensures safety of these facilities and sources was given. The various activities that ensures safety of the operation of these facilities during normal operation include control of radioactive discharges, consumer products, foodstuffs, chronic exposures from radon and conducting ambient and routine environmental monitoring. During accident situations, Ms. Palattao discussed extensively the objectives and operating framework of the National Radiological Emergency Preparedness and Response Plan. She also gave the guidance levels regarding radioactivity in food during accidental nuclear contamination and the immediate response guidelines to protect workers and the public

10) Thailand

Ms. Nanthavan Ya-anant, Head of Radioactive Waste Management Section, Radioactive Waste Management Center, Thailand Institute of Nuclear Technology (TINT) provided the updates of consolidated report of Thailand. She mentioned that the New Atomic Energy Act has been drafted. The new Act will cover the provision of radioactive waste management and spent fuel management. She gave the updates of Number of Radioactive Material Users and Radiation Generator Users. The number of user is increased. She also gave the updates of radioactive waste facilities, the new storage facility at the new site "Ongkharak" is completely constructed, and will be operated about the mid year of 2014. The last, she gave the information of public exposure at normal and emergency situation. The dose limits to the public at normal situation follows the recommendations by OAP- regulation based on International Basic Safety Standards. For the public exposure at emergency situation; a reference level expressed in terms of residual dose shall be set, typically an effective dose in the range 20–100 mSv, that includes dose contributions via all exposure pathways. The protection strategy shall include planning for residual doses to be ALARA below the reference level, and the strategy shall be optimized.

11) Vietnam

Ms. Pham Thi Quynh Luong, Senior Researcher, Department of Radioactive Waste Management, Vietnam Atomic Energy Institute (VINATOM) and Environment discussed Environmental Radiation Monitoring (ERM) and Public Exposure (Normal and Emergency Situation) in Vietnam. The Ministry of Science and Technology (MOST) is the Regulatory Body responsible for the unified State management of radiation protection and nuclear safety throughout the country; organizing and directing all radiation and nuclear safety activities. Atomic Energy Law 1, 2009 defined the duties and responsibilities of the radiation service

centers and radiation institution. The management of radiation safety within various radiation facilities is governed by the specific standards, codes and guides. National Environmental Radiation Warning & Monitoring Network has been set up in order to timely detect any unusual variation of radiation on the whole territory of Vietnam. Supports for proactive response to nuclear and radiological accidents; Protection of public and workers has to be monitored to make sure that the total amount of external and internal exposure doesn't exceed yearly limit of effective dose by personal a dosimeter and regular medical check in accordance with the applied regulations. Occupational Radiation limits for radiation worker and public were given by TCVN 6866:2001.

Session II: Summary and Discussion on Consolidated Report on Radiation Safety

An updated report consolidating drafts from the member countries was presented by the secretariat. To check and review the latest report, member countries were divided into 3 groups and each group discussed areas to improve comparing their reports. Each group presented the result of their discussion and agreed to edit their report by the end of October 2013.

Session III: Radioactive Waste Disposal/Treatment at Research Institutes

1) Australia

Ms. Lynn Tan gave a talk on Waste Treatment and Disposal in Radiation Institute in Australia. Australia does not yet have a final waste disposal facility. Each State, Territory and Commonwealth manages their own radioactive wastes generated within their own jurisdiction. The Australian Nuclear Science and Technology (ANSTO) operates the only research reactor in Australia. It conducts nuclear research and radioisotopes production for medical, industry, education and research purposes. All low and intermediate level radioactive wastes generated by the organisation are safely managed, treated and stored on site. Waste minimisation through segregation, treatment, decontamination for reuse and clearance for disposal are some of the strategies used to achieve volume reduction. Australia has also committed to build the first-of-the- kind SYNROC plant to treat its intermediate level liquid wastes from Mo-99 production. The facility will be operational in 2017.

2) Bangladesh

Dr. Moinul Islam outlined the regulations and Rad Wastes policy, possible source of generation of RWs in Bangladesh. The radioactive wastes inventory and characterisation of RWs also highlighted in the presentation. The research work relating with radioactive wastes, current situation of predisposal and disposal activities of RWs also been included in the presentation.

3) China

Mr. CHENG Qifu briefly explained radioactive waste management in research institutes in China. The characteristics, generated and treatment/disposal of radioactive wastes, and measures of radioactive waste minimization management in the research institutes in China were described.

4) Indonesia

Mr. Suryantoro delivered a presentation on management of radioactive waste in Indonesia. Radioactive Waste Technology Center (RWTC) is an organization unit under BATAN that has a responsibility and function to conduct radioactive waste management to prevent the rise of radiation danger of human and environment, as well as to support the operation on nuclear science and technology application safely. With Radioactive waste Treatment Installation (RWTI) and other support facilities, RWTC is able to serve management of solid and liquid radioactive waste rising from nuclear installation companies or radioactive substance users from BATAN as well as from others such as industries, hospitals, research institutions etc.

5) Japan

Dr. Yuji Matsuzoe, Manager, Research & Development Planning Sec., Fine Technology Development Dept. Manufacturing Center, Tokyo Branch, Fuji Electric Co., Ltd described the clearance level of radioactive waste as well as clearance level contamination monitor. And he also introduced the article contamination monitor which detects contamination of article such as screwdriver, long pipe and clothes, when carrying out outside from a radiation handling area. Furthermore, the food contamination monitor which detects the radioactive contamination in the food such as rice was also explained

6) Kazakhstan

Dr. Shayakhmet Shiganakov delivered a presentation on radiation waste management in Kazakhstan. Disposition and classification of radioactive waste (RW) are described in this presentation. Regulatory framework of RW management, including the content of main documents related to processing, storage and disposal of RW are outlined. The presentation includes the short description of spent fuel and liquid metal coolant management of fast breeder reactor BN-350. Basic information about the licensing in the field of RW management is presented.

7) Malaysia

Dr. Mohd Abd Wahab Bin Yusof explained the definition of radioactive waste in Malaysian law. The introduction of a new regulation, Atomic Energy Licensing (Radioactive Waste Management) 2011 was also presented. he explained the sources of radioactive waste in Malaysia which include institutional waste, industry, research institutes, medical and NORM

residues. He also explained about a new classification of radioactive waste under the new radioactive waste management regulations. Pre-disposal of radioactive waste was explained in detail from it collection until send to storage facility for safe keeping. All facilities for the safe management of radioactive waste which include low level effluent treatment plant, in-drum compactor storage facilities etc. were also shown in the presentation. The Inventory of disused sealed radioactive sources (DSRS) stored in the storage facility was also presented. Malaysia is planning to have borehole disposal concept for the disposal of Category 3, 4 and 5 DSRS. Finally, he explained about thorium residue disposal facility situated at Banjaran Kledang, Ipoh Perak.

8) Mongolia

Ms.Oyuntulkhuur Navaangalsan presented updates and status of radioactive waste management in Mongolia. The use of radiation sources in Mongolia, especially in the research field is very small in comparing with other countries and spent sources from different practices stored in centralized long term storage facility. Inventory of radiation sources used in research field and future needs for waste management also presented.

9) Philippines

Ms. Maria V. B. Palattao overviewed Implementation of the Borehole Disposal for Disused Radioactive Sources in the Philippines.

The PNRI initiated a project together with a core group composed of different agencies to select a suitable site for the implementation of the borehole disposal for disused radioactive sources in the Philippines. For this project, the core group implemented strategies for long term management of radioactive waste. One of which is the conduct of a study on the Co-location of near surface disposal facility and BOSS Facility for disused sources. This will be regulated as established in the PNRI Legislative and regulatory framework for atomic energy facilities and material. Several activities have already been undertaken such as long term conditioning of disused sources, site investigation and characterization in support of this project. The conditioning of Spent High Activity Radioactive Sources by NECSA was done through the initiative of the IAEA. NECSA was able to condition 18 units of teletherapy sources and 4 units of irradiator sources. For the preferred site, it was located in Northern Luzon (Mt. Bantay Kalbo, Brgy. Naddungan, Gattaran Cagayan) with a land area of 40 hectares. Drilling of boreholes was conducted to further investigate the site. Results of characterization showed that there was no major flaws found and the site has prospect to be developed for the co-location disposal concept. For further works, site characterization will be continued and iteration of conceptual design as well as performance assessment will be conducted.

10) Thailand

Ms.Nanthavan Ya-anant presented "Radioactive Waste Treatment at TINT". She gave the information of the R&D and nuclear applications at TINT. She mentioned that the TINT is the centralized Radioactive Waste Management Facility in Thailand. The Radioactive Waste Management Center is in charge of waste management operation such as: collection, transportation, segregation, treatment, conditioning, and storage. Low level solid wastes are treated by incineration and compaction. Low level aqueous wastes are treated by chemical flocculation-precipitation, and ion- exchange method. The treated wastes are solidified by cementation in 200 liter-drums. Treated Wastes in Drums are now kept in three storage facilities.

11) Vietnam

Ms. PHAM Thi Quynh Luong discussed Environmental Radiation Monitoring (ERM) and Public Exposure (Normal and Emergency Situation) in Vietnam. Radioactive waste in Vietnam is generated by research, industry, medical applications, research reactor operation and radiopharmaceutical production. Vietnam has no nuclear power plant.

Naturally occurring radionuclides (NORM) and technologically enhanced naturally occurring radioactive materials (TENORM) are produced in Vietnam by the mining, mineral sands processing and other resources sectors. So far, Vietnam has no national facility for radioactive waste storage and used radioactive sources. There are four largest RWM facilities, they belong to VINATOM.

Session IV: Technical Tour to Central Geological Laboratory and Discussion for further improvement of the nuclear facilities in FNCA countries

A technical visit to the state owned Central Geological Laboratory (CGL) was conducted in the afternoon of 11 September 2013. The CGL is the lead organization in Mongolia that offers a comprehensive range of mineral analysis techniques as well as environmental testing. Its main activities include analysis of mineral resources and coal, production of reference materials and certified reference material, environmental testing, determination of materials constituents and mineral processing technology tests. Initially, the FNCA participants were given a presentation that described the abovementioned activities including its various cooperation with other professional organizations both local and international and its accreditations. This was followed by a guided tour of various facilities and laboratories where the participants got to observed and discussed the state of the art equipment and analytical procedures implemented by the CGL highly competent staff. After a short break, a roundtable discussion was carried out wherein the participants provided their impressions, comments and recommendations that would further support the activities of the CGL. Everybody agreed that the laboratory has impressive activities, manned by highly qualified staff and equipped with state of the art equipment. Professor Kosako of Japan recommended

that it is very important for the laboratory to have a sustainable human resources program and develop communication with the general public and the higher echelons of the government to get wider support for all its activities.

[Session V] Wrap-up Discussion –Summary of Workshop and Future Proposals–

Participants reviewed the project activities implemented during phase 4(2011-2013) and agreed to cooperatively work towards the completion of a consolidated report on RS and the publication of the newsletter.

Member countries proposed several subjects to be discussed for the next three years. These include emergency response and preparedness, radioactive waste disposal, decommissioning, disused radiation source management, transportation, storage of spent fuel, uranium mining, NORM waste etc.

Prof.Kosako summarized the discussion and proposed the theme for the next phase -Progress of radiation safety of the general public during emergency and radioactive waste disposal situations. All member countries agreed to continue the project with this theme.

Kazakhstan was proposed as the next workshop venue.