

International Cooperation in the Area of Nuclear Safety Regulation: Current Status and Way Forward

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1. Introduction

Since the occurrence of the accident at the Fukushima Daiichi nuclear power plant in Japan which began on 11 March 2011, the global nuclear society faced a new phase in every aspect of that are related to nuclear power. Particularly, the global nuclear society again saw keenly the necessity of sound nuclear safety, thorough regulation, and effective emergency preparedness and response framework. Moreover, the fact that the responsibilities for ensuring and strengthening nuclear safety lay not only to each country, but also the importance of harmonized and collaborative global approach has once again emphasized.

One of the distinguished extensive international collaborative effort was the release of the IAEA's report by the Director General on the Fukushima Daiichi accident which was prepared by the IAEA and experts from its Member States. The report and its technical volumes identify more than 100 observations and lessons from the Fukushima Daiichi accident which provides a solid knowledge base to support strengthening nuclear safety throughout the world.

Another significant global effort and initiatives undertaken after the Fukushima Daiichi accident was the adoption of the Vienna Declaration on Nuclear Safety in February 2015. The Contracting Parties to the Convention on Nuclear Safety (CNS) collaboratively prepared the documentation of the Declaration and unanimously adopted it with the idea to prevent accidents with radiological consequences and to mitigate such consequences should they occur [1].

The OECD/NEA has been working closely with its member and partner countries to identify lessons learnt and follow-up actions at the national and international levels so as to maintain and enhance the level of safety at nuclear facilities following the Fukushima Daiichi nuclear power plant accident. In 2013, the NEA published a report entitled *The Fukushima Daiichi Nuclear Power Plant Accident: OECD/NEA Nuclear Safety Response and Lessons Learnt* detailing the key immediate responses of the NEA and its member countries. Subsequent to the publish of the report and based on the lessons presented, NEA published a new report entitled *Five Years after the Fukushima Daiichi Accident: Nuclear Safety Improvements and Lessons Learnt*, focusing on what has been done by the Agency and its member countries to improve safety since the accident in 2011. It provides a high-level summary and an update on activities performed by member countries and by NEA committees, as well as further lessons

learnt and challenges identified for future consideration [2].

Korea, in line with such global trend of emphasized importance in international cooperation and collaboration, and with the basis that ensuring high-level of nuclear safety is the uppermost challenge to the nuclear operating country, is actively participating in international cooperation activities at various levels respectively in multilateral, regional, and bilateral level mostly through information and expert exchange. In this paper, Korea's major international cooperation activities and possible measures to practically improve effectiveness of KINS' cooperation activities will be presented.

2. International Cooperation Activities

2.1. Multilateral Cooperation

Korea has participated in various multilateral cooperative activities to enhance international nuclear safety. As a nuclear advanced country, it actively participates in policy decision-making process of international organizations, including the IAEA and OECD/NEA to better contribute to establishing a global framework of enhanced nuclear safety and has shared nuclear safety regulatory experience with member states through strategic participation in sub-committees of international organizations and technical working groups.

2.1.1. IAEA

The cognition that joint response among countries is necessary to ensure global nuclear safety, the IAEA and its member states established Convention on Nuclear Safety (CNS) and Joint-Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (JC), and Korea is actively taking part in the Conventions as a contracting party. For the CNS, Korea has been participating in the Review Meeting since the 1st meeting, and currently for the preparation to the 7th Review Meeting, the Nuclear Safety and Security Commission (NSSC) established the 'Working Group for 7th National Report for the CNS' and KINS is carrying out major tasks on writing the report. Korea participated in the 5th Review Meeting for JC was held in 2015, and successfully carried out the obligation of the Contracting Party.

Moreover, Korea has invited Integrated Regulatory Review Service (IRRS) and its follow-up mission,

respectively in 2011 and 2014, to have its overall regulatory framework to be reviewed and to draw out areas to be improved.

Furthermore, Korea has supported IAEA regional networks such as Asia Nuclear Safety Network (ANSN), Arab Network of Nuclear Regulators (ANNuR) and Forum of Nuclear Regulatory Bodies in Africa (FNRBA) under IAEA Global Nuclear Safety and Security Network (GNSSN) to support infrastructure establishment and nurture competent personnel so that newly emerging nuclear countries are able to secure nuclear safety. Particularly, KINS is leading numerous topical groups such as regulatory infrastructure, safety analysis, etc. of ANSN, and providing education & training workshops to the member states of FNRBA and ANNuR.

2.1.2. OECD/NEA

OECD/NEA is supporting nuclear energy development as an environmental friendly and economical energy source through the cooperation of the member countries. Korea is participating in policy decision-making process of NEA including Committee on Nuclear Regulatory Activities (CNRA), Committee on the Safety of Nuclear Installations (CSNI), etc. as well as in numerous international joint research projects being carried out under the framework of OECD/NEA. Also, as a member to the MDEP (Multinational Design Evaluation Programme), a multinational initiative to develop innovative approaches to leverage the resources and knowledge of the national regulatory authorities that are currently or will be tasked with the review of new nuclear power reactor designs, Korea is participating in technical and policy decision-making meetings.

2.2. Regional Cooperation

After the Fukushima Accident, it has once again been confirmed that the consequence of an accident affects neighboring countries. In this vein, Korea, China and Japan reaffirmed the utmost importance of strengthening nuclear safety and continue to safely operate nuclear facilities with the maximum level of transparency. Korea-China-Japan Top Regulators' Meeting (TRM) was established in 2008 as a regional cooperative body to enhance nuclear safety in the northeast Asia region. The TRM is being operated as a practical and tangible framework of cooperation among three countries. Information on major key issues of each country is being discussed during annual regular meeting, and three working groups are being operated to enable in-depth discussion. The topics of working groups are about establishing an online information exchange system, sharing information and experience on emergency preparedness and response, and human resource capacity building. Particularly, in the area of emergency preparedness and response, joint emergency drill is being held every year. In 2014, the first joint emergency

preparedness drill was held at Kori Site. During the drill, experts from China and Japan participated as liaison officers. As such, Korea is actively participating in TRM to share information and experience with the ultimate goal of improving nuclear safety capabilities in northeast Asia region.

2.3. Bilateral Cooperation

Bilateral Cooperation in the area of nuclear safety is being carried out under the framework of bilateral agreements. As of August 2016, NSSC and KINS have concluded agreements with 22 organizations in 14 countries, and pursuing cooperative activities under respective frameworks.

In March 2014, NSSC and the United States Nuclear Regulatory Commission (USNRC) established a steering committee to facilitate effective and efficient bilateral cooperation in technical areas which require in-depth discussion. The regular meeting is being held on an annual basis to review the cooperation status and to select and prioritize cooperation topics. Currently, cooperation in the area of safety R&D, decommissioning, spent fuel management, safety culture, aircraft impact assessment, reactor operator licensing, fire protection, and steel-concrete structure is being discussed under the framework of the steering committee. Moreover, about 9 KINS experts have been dispatched to the USNRC respectively for a year in the areas of common interest and issues including safety analysis codes, aging management, digital I&C, PSA, structural and site safety, spent fuel.

As well, Korea is engaged in cooperation with many countries respectively United States, Germany, Finland, Sweden in the area of decommissioning and spent fuel management. As the Nuclear Safety Act was revised especially in preparation for safe reactor decommissioning process in January 2015, and the decision to permanently shutdown Kori Unit 1 was made in June 2015, the necessity of technical and regulatory competence for safe reactor decommissioning has emerged. Additionally, all NPP operating countries share common interest in spent fuel management. Korea is currently operating a repository only for low- and intermediate-level waste, and all the spent nuclear fuel are being stored at each site. Since the saturation point of on-site storing capacity is expected to be reached in the near future, management of such spent nuclear fuel is an emerging issue in Korea. Under such circumstances, Korea has reached out to countries with leading experience with decommissioning and spent fuel management to share information and experience through technical visits and meetings.

3. Way Forward and Conclusion

Based on lessons learned from the cooperation activities of the past, and due to the changes in the internal and external environment, it is necessary to

consider measures and strategies to improve the effectiveness and efficiency of such activities.

First, cooperation based on the needs of technical area would further enhance effectiveness of cooperative activities and would enable to foresee future regulatory needs which can be considered when establishing a strategy. Since the establishment of NSSC in 2011, NSSC has played a major role in concluding agreements with regulatory bodies of other countries. Despite of the change, KINS, yet, is able to pursue technical-specified cooperation as a TSO under the umbrella of agreements between governments or regulatory bodies. To cope with the changes in the working environment, and, more importantly, to ensure continuity and effectiveness of cooperative activities, apprehending practical technical cooperation needs in regular basis and pursuing cooperation with suitable foreign organizations based on the needs is required. Moreover, such approach would enable to understand regulatory issue of the time and future regulatory needs which will also help in setting strategies and priority focuses.

Second, establishment of expert pool and systematic mid- and long-term capacity building framework of relevant experts would enhance continuity and expertise. Currently, most of the participants or members of the committee or major regular meetings of international organizations are carried out by mostly seniors whom are nominated based on their positions. This causes a problem of lacking continuity of expertise related information in relevant committees or meetings once they retire or leave their position. Changing the nomination principle of members to the committees and major meetings to be based on their expertise rather than the positions they are holding and ensuring their membership for certain period could be a solution to the issue as well as making them feel responsible for the task. However, there still remains a problem with internal cognition towards participating in international cooperation activity as a member that the task belongs to the department or division related to certain committee or meeting. Establishment of an expert pool composed of seniors and juniors of relevant technical areas, and participating in a committee or a meeting in pair with main and sub-member concept, as well as setting up and operating mid- and long-term capacity building framework of such experts not only would enable the respective experts to feel responsibility for their membership, but also possibly solve the conflict caused by the internal perception towards international cooperation activities.

Third, strategic approach needs to be taken when selecting the counterpart and concentrating on the selected partner especially when providing support to the newcomers. There are increasing number of countries reaching out to KINS, requesting for support in the form of workshop, expert exchange, etc. Yet, until now, majority of supporting activities has been carried out in response to the request of potential beneficiary countries in the specific areas they propose, and are

based on a case by case education & training, without fully considering mid- and long-term support plan. However, it is believed that taking both qualitative and quantitative approach, which is to establish tailored support strategy to the respective support-receiving country would enhance effectiveness of such support activities. These includes measuring and analyzing the intensity and duration of support activities by examining and selecting technical areas to support, based on comprehensive safety and regulatory information such as plans to introduce nuclear power, economic status, regulatory infrastructure, etc. and the regulatory needs and status.

The suggested above are only a few measures to possibly and practically enhance effectiveness and efficiency of the international cooperation activities that are being carried out by KINS in the area of nuclear safety and regulation. Currently, KINS is endeavoring to set up the mid-term international cooperation strategic plan. There still remains much assessment and consideration of many aspects of such activities, yet, it is firmly believed that the establishment of such strategic plan would contribute to the improvement of the cooperative activities and to the enhancement in capacity of relevant staff members, as well as contributing to the strengthening global nuclear safety.

[1] Measures to Strengthen International Cooperation in Nuclear, Radiation, Transport and Waste Safety, IAEA, pp. 1-3, 2016.

[2] Five Years after the Fukushima Daiichi Accident: Nuclear Safety Improvements and Lessons Learnt, OECD/NEA, pp. 3, 2016.