A Study on the Status of Safety-Security Interface

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1. Introduction

In the recent years, the interest of the countries with nuclear power plants towards the needs to strengthen the management of the interface between safety and security is in growing trend.

Establishing and maintaining an effective interface between safety and security at a nuclear facility is to ensure the potential adverse effects from implementation of changes to safety and security measures are considered and addressed prior to implementation. And, the interface is an important element of both programs relative to ensuring public health and safety.

With such importance being recognized, the Member States of International Atomic Energy Agency (hereinafter "IAEA") continue to encourage the IAEA to facilitate coordination of the safety-security interface. [1]

The IAEA, as the global organization playing central role in efforts to strengthen nuclear safety and security, organized the Interface Group in 2017 comprising of the chairs of Nuclear Safety Standards Committee, the Radiation Safety Standards Committee, the Transport Safety Standards Committee, the Waste Safety Standards Committee and the Nuclear Security Guidance Committee. The Interface Group conducted a review a review of all document preparation profiles for Agency safety standards and nuclear security guidance publications to identify whether there were any safety and security interface.

The International Nuclear Safety Group (hereinafter "INSAG"), stressing that the safety and security obligations serve to reinforce each other even the activities for strengthening safety and security have a different focus, yet, as they overlap with each other, published a report on the interface between safety and security at nuclear power plants (INSAG-24).

As such, the importance of managing the interface between safety and security is being globally recognized and considerable amount of effort is being made. However, given the fact that the idea of the safety and security interface in Korean regulation is not specifically addressed in a coordinated fashion, it is considered necessary to establish a solid measure to coordinate the interface and its management.

In the course of preparing this paper, the status of Korea and other countries' management of safety and security interface has been studied, and the proposal for Korean regulation's way forward will also be presented.

2. Diagnosis on the current SSI status of Korea

2.1. Composition of responsible organizations

The Nuclear Safety and Security Commission (hereinafter "NSSC") was established in October 2011 as a single governmental body for integrate management of nuclear safety and security, with two regulatory expert organizations supporting, Korea Institute of Nuclear Safety (hereinafter "KINS") and Korea Institute of Nuclear Nonproliferation and Control (hereinafter "KINAC").

Since the NSSC is a single governmental body responsible for the management of both safety and security, it is viewed as an effective framework to address safety and security interface with identification of specific provisions important for integration, providing sufficient background for strengthening management and regulatory oversight.

2.2. Legal basis

From the perspective of nuclear safety, there is a legal framework established in Korea for oversight and enforcement of security arrangements needed for maintaining nuclear safety as below:

The revision made to the Article 7 of the Act and the Enforcement Decree on the Physical Protection and Radiological Emergency (hereinafter "APPRE") in 2013 and 2014 requires evaluation of safety effects caused by the physical protection system and complementary measure for nuclear facilities. [2], [3]

The revision made to the regulatory standards for cyber security, KINAC/RS-015, in 2016 requires the analysis of effectiveness of cyber security control and regular inspection of the general cyber security plan, including mutual interface between safety and cyber security.

Based on the KINAC/RS-015, KINAC performs review and inspection of both operating nuclear power plants and the ones under construction. As for the

operating plants, since the KINAC/RS-015 requires numerous cyber security measures and continuous risk assessment, yet, due to the nature of the operating plants, there lay much restrictions to perform detailed analysis of the systems and design change while operating. With such cause, unless any technical security measures are indispensable to be taken, alternative measures are being taken by considering the interface between safety and security. For the review of plants under construction, the KINAC developed cyber security regulation for the construction nuclear facility in 2016 and confirmed the regulatory review plan in consultation with KINS, to consider the interface with safety regulation. [4]

2.3. Regulatory oversight activities

Based on the legal basis presented in 2.2, number of regulatory oversight activities related to both safety and security are being carried out.

In accordance with the National Radiological Emergency Plan, activities for the mutual interface between safety and security in emergency response are being coordinated. The activities cover both emergency response to incidents of nuclear safety as well as emergency response to incidents of nuclear security, with involvement of KINS and KINAC. [5]

The NSSC established regional offices in 4 nuclear sites and enhancing their activities. In particular, the regional offices perform joint emergency response inspection participated by the regional inspectors from NSSC, KINS and KINAC, focused on the general emergency response system for nuclear safety, radiological emergency, and radiological terrorism incidents for nuclear facilities with the objective to prevent disasters and enhance risk control.

2.4. General observation of the current status

Korea has developed a comprehensive approach addressing the interface between safety and security in an effective manner. It includes availability of necessary legal provisions, availability of safety and security staff of the NSSC as well as KINS and KINAC.

On the other hand, it is viewed that identification of specific technical areas which are potentially susceptible to have effect on both safety and security and development of regulatory measures to manage the interface are deemed important. Additionally, development of specific guideline and plans to address the interface will further contribute to the strengthening of regulatory oversight of the interface in the licensed organizations as well as the licensees' implementation of the measures for adequate management of the interface.

3. Case study of foreign regulators

3.1. U.S. Approach

The U.S. Nuclear Regulatory Commission (hereinafter "USNRC") established regulatory requirements for the safety-security interface in Title 10, Code of Federal Regulations, Part 73.58 (10 CFR 73.58) "Physical Protection of Plants and Materials", and developed a guidance for the requirement as 'Managing the safety/security interface (Regulatory Guide 5.74)' in 2009 to specifically address the management of the safety and security interface, and has been utilizing to perform relevant regulatory activities. It incorporates similar recommendations for analyzing potential conflicts between safety and security considerations at nuclear power plants.

This regulatory guide has been developed and revised in consideration of IAEA safety guides and, particularly IAEA Nuclear Security Series No. 13 "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5).

The regulatory guide describes a method that the staff of the USNRC considers acceptable for nuclear power plant licensees to assess and manage changes to safety and security activities with the purposes to prevent or mitigate potential adverse effects that could negatively impact either plant safety or security at power reactors. It focuses on physical and cyber security, especially on the digital technological changes made to safety systems which previously contained no digital equipment. Also, the necessity to consider the impacts of cyber security to safety analyses is being addressed. [6]

Based on the regulatory framework as described above, the USNRC manages the interface between safety and security with the purpose to prevent any delays of scheduled activities, unintended security vulnerabilities, unintended impacts to safety systems and emergency response activities.

3.2. Canadian. Approach

The Canadian Nuclear Safety Commission (hereinafter "CNSC") established a regulatory document REGDOC-2.1.2 "Safety Culture" in 2018 to set out requirements and guidance for fostering a healthy safety and security culture and for conducting safety and security culture assessments. The CNSC defines security culture as the characteristics of the work environment, such as the values, rules, and common understandings that influence workers' perceptions and attitudes about the importance that the organization places on security.

The REGDOC-2.1.2, safety culture and security culture coexist through the shard common objective of limiting risk, and they share common goals and techniques for promotion and monitoring activities. The term "safety culture" addressed in the document denotes both safety culture and security culture collectively, except where a distinction is made. [7]

The CNSC views that there are only a few key differences between safety and security culture, and it is critical for a nuclear organization to fully understand the interface between safety and security and the potential consequences of interfering with the other.

Also, to promote effective interfacing, the CNSC operates common core training for inspectors regardless of their specialty, developed and delivers basic security inspection training course to field safety inspectors, and endeavors to seek for balanced solutions using a risk-based approach without compromising safety and security.

Such efforts are being pursued, at the operational level, by enhancing internal communications including holding open discussions on crosscutting areas, revising safety inspection procedures to include security components, drafting of new inspection worksheets for security requirements, and providing additional security training for inspectors as a part of inspector training and qualification program.

4. Proposal to further enhancement of SSI in Korea

In the course of preparing this paper, the current status of SSI in Korea and the approaches of foreign regulators have been looked into.

It is viewed that the current SSI management framework of Korea is in place with a single organization responsible for both safety and security, overarching legal basis to support relevant activities. However, there still remains some rooms for further improvement.

As for the organizational structure, there are two different expert organizations supporting the NSSC, KINS and KINAC which are responsible for respectively safety and security. The NSSC itself is a sole domain responsible for both safety and security, yet, as two different organizations independently pursue related activities for safety and security, enhancement of the NSSC's role of coordinating the interface between KINS and KINAC would be crucial in improving the management of the interface between safety and security.

Also, even there is an overarching legal framework touching upon safety and security interface, however, the specific regulatory guide particularly addressing the management of the interface is not yet developed. Development of such regulatory guide will not only contribute to the enhancement of the coordination effort of NSSC between safety and security, but also, by specifically describing the interfacing areas, would provide detailed measures for regulators and licensees to assess and manage the interface at a working level.

In order for an effective interface management to be realized, the below activities are suggested to be considered;

- Defining roles and responsibilities for safety inspectors and security specialists
- Inspection tools and procedures to be updated to perform combined safety-security inspections
- Development of security-specific training for safety inspectors
- Enhancement of planning, communication and coordination of safety and security activities at all levels
- Coordination between related organizations during the preparation of regulatory document
- Further identify and add linkages between safety and security documents

It is crucial to have in mind that the safety and security are equally important. As there are measureable steps to be taken to improve the interface, the responsible organizations should endeavor to improve nuclear safety and security in Korea to ensure protection of the public health and safety, and to protect the environment.

[1] IAEA, Nuclear Safety Review 2018, Paragraph 252, pp. 53, 2018
[2] NSSC, Act on Physical Protection and Radiological Emergency, Article 4, 2018
[3] NSSC, Enforcement Decree of the Act on Physical Protection and Radiological Emergency, Article 7, 2017
[4] KINAC, 2017 Annual Report for Cyber Security Division, pp. 61-70, 2017
[5] NSSC, the 1st National Radiological Emergency Plan 2015-2019, 2015
[6] USNRC, Regulatory Guide 5.74 "Managing the Safety/Security Interface" Revision 1, 2015
[7] CNSC, Regulatory Document REGDOC-2.1.2 "Safety Culture", 2018