

## Analysis of Domestic Safeguards Approaches: Different Views between the ROK and U.S.

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### 1. Introduction

Safeguards Agreement between Republic of Korea (ROK) and the IAEA was entered into force on November 14, 1975 and IAEA has been inspecting on the ROK's special fissionable materials since then. In addition, Additional Protocol to the ROK was also entered into force in February 2004 for the purpose of detecting undeclared nuclear activities. The ROK revised Nuclear Safety Law to enforce the obligations according to the Agreement and the Protocol. The law requires nuclear material holders (NMHs) to develop nuclear material accounting and control rule which shall be approved by the Nuclear Safety and Security Commission (NSSC), ROK's State Regulatory Authority.

The KINAC, Technical Support Organization for the NSSC, has been carrying out reviews on the rules submitted by the NMHs and conducting domestic independent safeguards inspection to ensure that the NMHs are implementing the safeguards obligations according to the approved rules and checking whether the NMHs are ready for the IAEA's safeguards inspection.

The United States, likewise, signed the safeguards agreement with the IAEA and is undergoing IAEA inspections on some nuclear facilities, while the U.S. NRC, Nuclear Regulatory Commission, implements the domestic independent safeguards inspection for nuclear security purposes.

In this paper, differences between the U.S. and the ROK on domestic safeguards inspection are compared, recommendation for enhancement of both nuclear security and safeguards of ROK are suggested.

### 2. Methods and Results

#### 2.1 IAEA Safeguards in the U.S. and Role of NRC

As a nuclear weapon state under the NPT, the U.S. is not obligated to undergo the IAEA's safeguards. However, The U.S. voluntarily agreed to permit the IAEA's safeguards inspection by signing the safeguards agreement between the U.S. and the IAEA in 1977. The additional protocol to the U.S. was also signed in 1998

and was entered into force in 2004. More than 250 nuclear licensees regulated by the NRC can be subject to the IAEA safeguards. Specifically, the NRC established 10 CFR Part 75 to specify the obligations of NRC and nuclear licensees under the safeguards agreement with the IAEA. Licensees selected to undergo IAEA safeguards are required to submit a design information questionnaire and initial inventory of nuclear material to the NRC. Then the NRC reviews and submits those documents to the IAEA. And the licensees undergo the IAEA's inspections which are accompanied by the NRC employees during the visit.

#### 2.2 NRC's Domestic Safeguards

The NRC not only implements the IAEA safeguards but also implements domestic safeguards regulation. The purpose of NRC domestic safeguards is to ensure that the special nuclear materials are not stolen or diverted and exposed to a radiological sabotage risk.

The special nuclear materials (SNMs) are plutonium, uranium-233, and uranium-235, as defined by the Atomic Energy Act of 1954, and are classified in three categories according to its significance, and differentiated control & accounting requirements for each classification are applied. The three categories of special nuclear materials are strategic special nuclear material (SSNM), moderate strategic significance (MSS) and low strategic significance (LSS). As general requirements, SNM holders should report Material Balance Reports to the NRC in accordance with Subpart B of 10 CFR Part 74, and record any changes made to SNM by transfer or receive. The SNM holders should also keep relevant records in documentation to afford the NRC inspections. In addition, if loss or theft or committed theft or unauthorized production of SNM occurs, it shall be reported to NRC within one hour of the discovery.

The holders of MSS materials are required to have additional measurement and measurement control capabilities to the requirements for the LSS materials holders. The SSNM materials holders are required additional process monitoring and material monitoring.

#### 2.3 Differences in Domestic Safeguards

The roles of NRC and KINAC and the roles of nuclear licensees are similar under the safeguards agreement with the IAEA. The NRC and KINAC perform technical support roles during IAEA inspections, and nuclear licensees in each country should conduct material accounting management, submit the accounting reports such as inventory change report, material balance report and physical inventory list, and undergo IAEA inspections. However, there are some differences between NRC and KINAC in the case of domestic safeguards. The NRC's main objective of domestic safeguards program is to ensure that special nuclear material is not stolen or otherwise diverted from civilian facilities for possible use in clandestine fissile explosives and does not pose a radiological sabotage risk. Thus this objective meets the NRC's mission which is to regulate the radioactive materials to provide reasonable assurance of adequate protection of public health and safety and to promote the common defense and security and to protect the environment.

However, the NRC's objective is very different from ROK's domestic safeguards program which aims to ensure that the nuclear material holders subject to IAEA's safeguards have established proper system for material control and accounting and meet the safeguards requirements specified in the relevant safeguards regulations issued by the NSSC. The requirements are similar to the NRC's requirements specified in the 10CFR Part 74. However, ROK's domestic safeguards inspection focuses on whether NMHs are ready for the IAEA's inspection while NRC aims at ensuring that the special nuclear materials are protected against sabotage, theft, and diversion.

Table 1: Differences in Domestic Safeguards

	NRC	KINAC
Objective	Strengthen Nuclear Security	Strengthen Nuclear Transparency
Inspection	Ensure that SNM is not stolen or diverted	Check whether NMHs are affordable for IAEA safeguards
Notification	Notify within 1 hour of discovery	No immediate notification
Penalty	Strong	Weak

Another difference is that the NRC requires licensee to notify the NRC's operating center within 1 hour of discovery of any loss or theft or other unlawful diversion of special nuclear material. This requirement is necessary because the NRC's domestic safeguards is to promote nuclear security which requires immediate detection and response. Hence, ROK's domestic safeguards regulation does not specify one hour notification since the IAEA safeguards is not designed for a real-time detection.

Also, adversary who attempts to defeat or circumvent domestic safeguards measures faces the real possibility of being physically injured under the NRC's domestic safeguards regulation. However, such physical damage is unlikely happened in ROK's domestic safeguards regulation.

Thus, it is clear that the NRC's domestic safeguards contribute to the strengthening of nuclear security while it can still reinforce international safeguards led by the IAEA. Although ROK's domestic safeguards program is focusing on the enhancement of nuclear transparency in Korea, safeguards measures such as containment and surveillance is somehow devoting to the enhancement of nuclear security.

It would be beneficial if the ROK revise existing domestic safeguards regulation program to cover not only international safeguards but also nuclear security. But, various aspects need to be considered since there exists difference between safeguards measures and security measures. One example is the seals which is very effective for verification of unauthorized tampering but does not properly provide protection against stealing nuclear material. This will be another research area to be further studied.

### 3. Conclusions

The NRC's international safeguards obligation along with domestic safeguards program was reviewed. And difference between KINAC's domestic safeguards and NRC's program were presented. NRC's domestic safeguards program aims to ensure that the special nuclear material is not stolen or diverted and does not pose a radiological sabotage risk while KINAC's program is to ensure that the NMHs established and properly implementing the international safeguards program so that the NMHs will be affordable for the IAEA's safeguards inspection. It was recommended that the ROK need to consider a revision of the domestic safeguards program to not only cover the international safeguards but also the nuclear security.

### REFERENCES

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