Accomplishment and Suggestion of ROK's Nuclear Material Accountancy and Control (NMAC) for Nuclear Security

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1. Introduction

Nuclear material accountancy and control (NMAC) is not only an obligation under IAEA Safeguards, but also it is one of the important measures to national nuclear security regulation.

The importance of NMAC to nuclear security has been emphasized by international organization like IAEA, GICNT and nuclear security summit. The various guidance from IAEA INFCIRC/225/Rev5, etc. recognized that strengthening the NMAC system is indispensable for nuclear security aspects like access control to nuclear material, detection/deterrence of theft or unauthorized removal, insider intrusion, etc. This paper describes background, features, and institutionalization of ROK's NMAC system. Also, it includes the explanation of ROK's NMAC regulation activities, introduce new type of NMAC inspection system that can help the nuclear security. And finally, it will suggest the consideration for more strengthening the NMAC for nuclear security regulation.

2. NMAC regulation activities in ROK

By the end of 2017, a total of 43 material balance areas (MBAs) were subjected to IAEA-led and national inspections. As the ROK's NAMC regulation activities, KINAC performed 10 regular inspections on licensees' accountancy management of certain nuclear materials. In addition to the regular inspections, one pre-check was performed prior to specific nuclear materials' first entry into the facility, and six inspections on a rolling basis to check whether licensees were following the accountancy provisions at all times. Now, NMAC regulation has been able to assure that facilities' NMAC system not only has a substantial quality but also functions systematically since January 2015. Changed NMAC regulation has differences rather than the previous things. The fundamental NMAC regulation objective has been to assure the compliance of requirements and implementation of NMAC legal obligations. And the NMAC inspection system was restructured for strengthening the national NMAC regulation.

Fig. 1. Structure of the accounting and control system of nuclear material.

3. Consideration for strengthening the NMAC in nuclear security regulation

Through the NMAC system, the nuclear materials in facilities were controlled through maintaining accurate bookkeeping and balance of the inventory of

material etc. And it can help to detect and deter the unauthorized removal of nuclear material that are interested in nuclear security. There are common points between NMAC and nuclear security inspection. Accounting information used by both sides is the same. Both inspections are focused to provide assurance that all nuclear material is accounted for, to provide a timely detection of material loss or diversion, to determine amount and location of any missing material and to deter and detect unauthorized removal of nuclear material. Well controlled facilities' NMAC system is possible to maintain and report accurate, timely, complete, and reliable information on the locations, quantities, and characteristics of nuclear material in the facility's possession. And it can ensure continuity of knowledge to enhance the ability to deter and detect unauthorized removal.

For example, checking the management of nuclear material is one element in physical protection inspection in ROK. In this check point, we have inspected the suitability of facilities' NMAC management, tracking of their locations, movements and changes of nuclear materials, security measures of storage area, and recovery procedures of stolen materials, etc. Those activities can also cover in national NMAC inspections procedures.

Presently, national NMAC and physical protection inspection are being divided and performed independently in ROK. And additionally, facility operators who are charging with NMAC are closely related with the nuclear safeguards activities and NMAC implementation but they are usually not engaged in the physical protection parts. In order to make up this activity, if the both inspections will be performed at the same time ideally, it can lead to more synergy of NMAC for nuclear security. And when the NMAC inspection was performed in nuclear facilities, the information of NMAC should be delivered to the physical protection parts.

4. Conclusion

NMAC and physical protection are complementary systems to deter and detect unauthorized removal of nuclear material that is concerned in nuclear security. Well controlled NMAC system should be able to detect unauthorized removal of nuclear material. So the facility operators should additionally consider the NMAC activities as one of the protective layers. Also, the national NMAC regulation have strengthened for assuring the substantial quality and systematical function in nuclear security.

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