Transactions of the Korean Nuclear Society Autumn Meeting
Goyang, Korea, October 24-25, 2019

Regulatory considerations on Training and qualification of Physical Protection Personnel in a Nuclear Facilities

Jeong-ho Lee
KINAC, 1534 Yuseong-daero, Yuseong-gu, Daejeon, Korea, 34054
friend25kr@kinac.re.kr

1. Introduction

Human factor is one of the most important factors in nuclear security. Security activities at a nuclear facility are more sensitive and sophisticated compared to activities at other facilities due to intrinsic characteristics of a nuclear facility. From regulatory or management perspective, it is not acceptable that security activities rely on personal characteristics or experience.

It is important to ensuring quality of service on security activities in order to avoid human errors or personal dependencies. There are many methodologies such as training, (limited scope, force-on-force) exercises in physical protection. Among those, training and qualification is a fundamental requirement to provide expertise to nuclear security.

KINAC has been struggling to provide expertise to nuclear security. Since establishing International Nuclear non-proliferation and Security Academy in 2014, KINAC provides various nuclear security training programs including a mandatory training program to cultivate and encourage nuclear security expertise. As well, KINAC has been conducting a study on improving effectiveness of training effort from regulatory perspective. In this paper, we would like to share the result of our study.

2. Human Factor in Nuclear Security

Human is a key factor in nuclear security. This is well addressed in IAEA Nuclear Security Series (NSS) especially related to nuclear security culture. Along with those emphasis, security activities in a nuclear facility requires special expertise due to intrinsic characteristics of a nuclear facility.

First of all, most of nuclear facilities are designated as critical infrastructures. Those facilities play key roles for national security. Moreover, a large amount of nuclear or radioactive materials are stored and used in the facilities. Because of those characteristics, security incidents in a nuclear facility gather huge public attention. The quality standard for security should be set in order to meet the expectation from general public.

Moreover, security activities require extra precaution in a nuclear facility. There are many kinds of hazardous materials and safety related equipment in a nuclear facility. For example, hazardous chemicals, such as high-purity sulfuric acid and sodium hydroxide, are stored and used in a nuclear power plant. As well, there are vital safety equipment that affect core reactivity or heat removal if they are compromised by sabotage. It is not difficult to imagine that extra precaution or provision are required for response activities close to areas where hazardous chemicals or vital safety equipment are stored or installed. Even if response force succeeds to neutralize adversaries, the response action could result in high radiological consequence in a nuclear facility.

3. Training and Qualification

High expertise is required considering sensitivity and severity of security activities in a nuclear facility. The high expertise and high qualification standard are difficult to be cultivated, so that most of states have legal requirements for training and qualification of nuclear security personnel. In this section, we would like to compare the regulatory requirements in U.S. and Korea.

3.1 U.S. Regulatory Requirements

U.S. NRC published the Regulatory Guide 5.75 called “Training and Qualification of Security Personnel at Nuclear Power Reactor Facilities.” In this guide, a nuclear power plant operator is required to define site-specific critical tasks. The tasks start from understanding the nuclear facility to handling detection equipment, communication devices, and firearms. Also, NRC requires nuclear operators to have fitness-for-duty programs by 10 CFR Part 26 to provide reasonable assurance that nuclear security personnel will perform their tasks in a reliable manner.

In NRC guideline 5.75, sixty-six site-specific critical tasks are identified. The tasks include not only security related task but also facility intrinsic characteristics such as:

(1) Recognition of sabotage-related devices and equipment that might be used against a facility
(2) Location of nuclear materials and/or vital areas within a facility
(3) Vulnerabilities and consequences of theft of nuclear material or radiological sabotage of a facility

Also, the guideline states requirements on training methods, performance evaluation program. It also provides duty qualification method and criteria from written examination and performance demonstration for initial and re-qualification.

One of qualification requirements is fitness-for-duty, which is required by 10 CFR Part 26. The requirement provides detailed physical fitness regulation from aerobic training to muscular strength and endurance training such as

(1) Scheduling and tracking fitness and medical appointments
(2) Maintaining compliance and inspection status
(3) Performance standards testing
(4) Writing and Justifying a program plan (Medical standards, physical performance standards, physical fitness assessments, physical fitness training and maintenance)

3.2 Korean Regulatory Requirements

Korean training and qualification requirements in nuclear security are stated in several acts. Training requirement for use of deadly force is stated in the Registered Security Guard Act. It only states the number of firearm training in a year. However, it does not provide any requirement for firearm qualification. Another act that states training and qualification requirements is the Physical Protection Act. It defines a bit detail training program and qualification requirements. However, the requirement for training program conducted in classroom seems to be designed for raising nuclear security awareness. The requirement for performance demonstration training (drill or exercise) does not state any qualification criteria. Any of those acts do not state fitness-for-duty requirements.

Looking into the Aviation Security Act might help to have some insights to improve training and qualification requirements in nuclear security. It states key tasks that need qualification, training programs, and qualification requirements. By the act, Korea Aviation Security Academy provides training program for security guards, security screener (guards conduct contraband detection), and security supervisors. The training program includes note only classroom training but also performance demonstration training. The duration of programs varies from one day to one week.

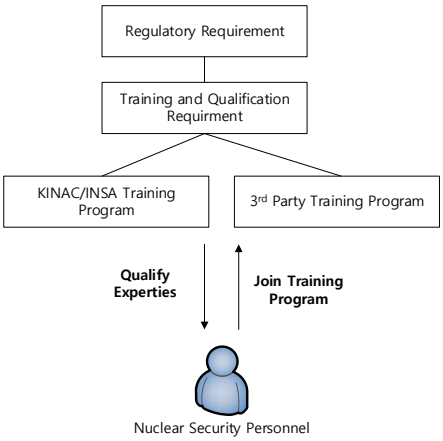
Korean nuclear security regime need to adapt the key concepts from the Aviation Security Act:

(1) Identifying key security tasks such as security guard supervising, contraband detection, or contingency response, dangerous good handling (explosive)
(2) Defining regulatory performance criteria
(3) Providing training programs to qualify and evaluate performance of key tasks

4. Future works

Training and qualification requirements are fundamental to implement reliable nuclear security. In the previous section, we reviewed the requirements by U.S. NRC and Korean domestic Aviation Security Academy. Those good practices provide insights to improve nuclear security training system to cultivate expertise.

First of all, we need to identify key tasks for Korean nuclear security. Those key tasks might be contraband detection, PPS operation in CAS, explosive ordnance disposal, and contingency response. Then, we need to develop training programs for each key task. We might establish collaboration network with other training center such as the aviation security training center to share training programs. At the same time, we have to prepare qualification regulatory requirements to revise the regulatory system.



5. Conclusions

Human factor is one of the most important elements in a nuclear security. It is unacceptable to carry out security activities depending on personal characteristics or experiences. The activities should be conducted in reliable manner. The reliability can be achieved by training and qualification regulatory requirements. In this paper, we discussed good practices on how U.S. NRC and Korean Aviation Academy are doing. The good practices provide insights on how we can improve not only effectiveness of nuclear security training but also expertise and reliability of security activities.

REFERENCES

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13, IAEA, Vienna (2011).
[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 27-G, IAEA, Vienna (2018).
[3] Act on Physical Protection and Radiological Emergency Act

[4] Aviation Security Act
[5] U.S. NRC Regulatory Guide 5.75 Training and Qualification of Security Personnel at Nuclear Power Reactor Facilities.
[6] U.S. NRC NUREG/CR-5690 Physical Fitness Training Reference Manual for Security Force Personnel at Fuel Cycle Facilities Possessing Formula Quantities of Special Nuclear Materials.