

## A study on the Protected Area of PPS

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### 1. Introduction

The primary objectives of the physical protection are to protect nuclear material from theft and unauthorized removal and to prevent the sabotage of nuclear material and facilities. To accomplish the objectives, a system for the physical protection (PPS) of nuclear material and facilities should be established and implemented under the "Law for physical protection and measures against radiological emergency" and the recommendations INFCIRC/225/Rev.4, which are considered as a baseline for the PPS.

KAERI, as a research organization, maintains several nuclear facilities in the boundary. Recently, KAERI established an upgraded PPS based on the change of the protected area from KAERI site to nuclear facilities. But the change of the protected area has been discussed with KINAC(Korea Institute of Nuclear Nonproliferation and Control) to meet the requirements of the law.

This paper reviews the definition of a protected area and evaluates whether KAERI's PPS is reasonable or not.

### 2. IAEA recommendations on PPS

IAEA distributed to member states INFCIRC/225/rev. 4 on the physical protection of nuclear material and nuclear facilities as a recommendation.

In the INFCIRC/225/rev.4, protected area is defined as 'An area under surveillance, containing Category I or II nuclear material, and/or vital areas surrounded by a physical barrier'. Also physical barrier is defined as 'A fence or wall or a similar impediment which provides penetration delay and complements access control'. Especially, in the requirements for physical protection against unauthorized removal of nuclear material in use and storage, 'the perimeter of the protected area should normally consisted of a physical barrier in addition to and outside the building wall. In cases where the walls of a building are of a specially solid construction, these walls may be designated as being the perimeter of the protected area under conditions specified by a security survey'.

### 3. Physical Protection Concept of Other Countries

The definition on protected area of other countries was investigated as follows;

#### 1) PP of USA

10 CRF of NRC is regulating the PP of nuclear facilities in USA such as PP of special nuclear material in transit, PP requirements at fixed sites, PP of special nuclear material or moderate and low strategic significance, Records and reports and Enforcement.

With regard to the definition of protected area in 10 CFR, the protected area is defined as "An area encompassed by physical barriers and to which access is controlled." Also, a physical barrier is defined as fence, building and other physical obstruction. Especially, a building as a physical barrier is defined as "Building walls, ceilings and floors constructed of stone, brick, cinder block, concrete, steel or comparable materials (openings in which are secured by grates, doors, or covers of construction and fastening of sufficient strength such that the integrity of the wall is not lessened by any opening), or walls of similar construction, not part of a building, provided with a barbed topping described in paragraph (1) of this definition of a height of not less than 8 feet".

Also, NRC promotes a defense in depth using graded physical protection areas: Exclusion Area, Protected Area, Vital Area, and Material Access Area barriers and controls

#### 2) PP of Japan

The "Law for nuclear source material, nuclear fuel material and nuclear reactor" of Japan defines PPS of nuclear material and nuclear facility. In the law, the protected area is obviously defined by the category of nuclear materials as shown in figure1.

For nuclear material of category I, the protected area should be established in the surrounding protected area with physical barrier, lighting, sensor, etc.

For nuclear material of category II, the protected area with a firm physical barrier should be established. Especially, the firm physical barrier means a wall made of concrete containing iron bar and iron door.

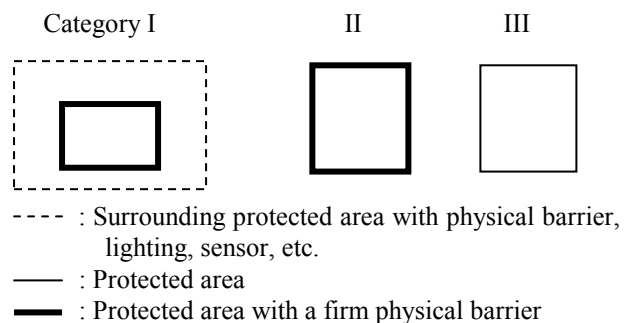


Figure1. Protected area in Japan

### 3) PP of Other Countries

The PPS of Czech Republic, Switzerland and Finland are reviewed briefly. But they are not based on a Research Reactor but a Nuclear Power Plant. With regard to the protected area, PPS of Switzerland was characterized by multi-layered boundaries. That of Czech Republic was characterized by the wide protected area.

### 4. PPS Upgrade in KAERI

KAERI has operated a PPS to protect its nuclear material and nuclear facilities. The existing PPS concept of KAERI defended a wide area including several nuclear facilities (containing nuclear material classified by category). But it was not effective to protect and defend a wide area against the theft of nuclear material and the sabotage of nuclear facility.

To improve the PPS, KAERI established an upgrade plan enhancing functions of PPS of the nuclear facilities. According to the plan, KAERI installed additional PPS equipment to strengthen the functions of PPS such as detection, delay, entry/exit control, communication and others as shown in table 1 and table 2.

Table1. Category II

Function	Upgrade	Remarks
Detection	○	Surveillance Sensor
Delay	○	Barrier
Entry/exit Control	○	Identification of individual
Communication	○	No comment

Table2. Category III

Function	Upgrade	Remarks
Detection	○	Surveillance Sensor
Delay	-	Existing sys.
Entry/exit Control	-	Existing sys.
Communication	○	No comment

After the completion of upgrade of PPS, KAERI revised the internal regulation on PPS and submitted it to MOST for approval.

### 5. Conclusion

During the upgrade of its PPS, KAERI changed the protected area from the KAERI site to nuclear facilities. The protected area discussed with KINAC may be considered as each nuclear facility from the definition and requirements of IAEA INFCIRC 225 rev. 4 and regulations of USA and Japan.

Also, the upgraded PPS of KAERI, based on the change of protected area, fulfills the objectives of PPS

as well as meets the requirements of international guideline & domestic law.

### REFERENCES

- [1] INFCIRC/225/Rev.4 “The Physical Protection of Nuclear Material and Nuclear Facilities”, IAEA, Austria, March 1997
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- [3] Part 73 in 10 CFR of NRC Regulation, “Physical Protection of Plants and Material”, USA
- [4] “Regulation on Nuclear Source Material, Nuclear fuel Material and Nuclear Reactor”, Japan, 1957