

Physical Protection Measures with respect to Insider Issues

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1. Introduction

A physical protection system (PPS) integrates people, procedures, and equipment for protection of assets or facilities against theft, sabotage, or other malevolent human attacks [1]. And the adversary which includes outsider and insider performs the theft, sabotage, and other malevolent attacks. The term 'insider' is used to describe one or more individuals with authorized access to nuclear facilities or nuclear material in transport who could attempt unauthorized removal or sabotage, or who could aid an external adversary to do so [2]. In general, the physical protection system of nuclear facilities is designed and operated focused on detecting, delaying, and responding against outsider threat. However, the insider is also the feasible and practical threat. The insiders could take advantage of their access, complemented by their authority and knowledge of the facility, to bypass dedicated physical protection elements or other provisions such as safety, nuclear material control and accountancy, and operating measures and procedures [3]. Therefore, the insider threat should be considered when the physical protection system is designed, evaluated, and operated. In this paper, the characteristics of insider threat and physical protection measures against insider threat are discussed and suggested.

2. Differences between insiders and outsiders

Typically the physical protection system is designed to protect the adversary who attacks from outside of the facility. Fig 1. simply shows physical protection system for protecting adversary from outside of the facility.

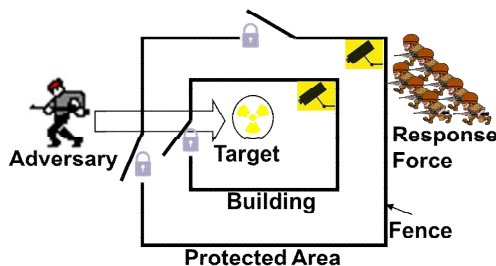


Fig. 1. Simple physical protection system for protecting adversary from outside of the facility.

The concept of this physical protection system is comparing adversary task time and physical protection response time. It means that the response time which includes detection of adversary and response force time should shorter than the time for adversary success his

task. Therefore, timeline analysis is important and used to analyze the physical protection system.

On the other hand, the insider's task does not influenced by time. For example, the insider could commit protracted theft of small amounts of nuclear material from several locations, in each of which the quantity of material is not attractive to an outsider. Insiders have more opportunity to select the most vulnerable target and the best time to perform or attempt to perform the malicious act [3]. Further, insiders have advantages such as authorization of facility access and equipment operation, knowledge of facility, information of nuclear events, etc.

3. Physical protection measures against insiders

The physical protection system was established and operated with no consideration of insider threats. And insider threat is barely recognized, responded, and protected. However, some measures which are performed by nuclear licensees and related to safety and security could be affected the insiders. For example, trustworthiness assessments are conducted when people get their regular access authorization. When conducting tasks for facility operating and maintaining, operators or workers should perform their duties under control of supervisor or inspector. Information related nuclear material transportation should be treated as a confidence. Regular physical protection education and training should be completed.

These safety and security related measures could reduce insider threat, but more systematic approaches are needed.

3.1 Preventive measures

To reduce or remove possible of insider threat, or to minimize threat opportunities, or to prevent a malicious act from being carried out, 'preventive measures' are used [3].

Trustworthiness assessments check the motivation or behavior of persons who could become insiders. The nuclear licensee currently performs the identity verification and criminal records checks. More factors, such as past work history, financial records, medical records, and psychological examination should be reviewed. And periodic checks should conducted as well.

Surveillance of workers for maintenance, service, or construction should be conducted. According to the act on physical protection and radiological emergency

(APPRE), the visitors and temporary workers should be under control of facility guide such as guards, supervisors or inspectors. This escort and surveillance must keep their staying in the facility, but it is hard to implement especially on an overhaul period because of insufficient manpower. Regular and random patrols by guards, supervisors or inspectors for working areas could be complementary measures of incomplete escorts.

Regular physical protection education and training should be conducted based on APPRE. These kinds of security awareness programs could contribute to an ongoing security culture in the facility. The education and training programs are currently focused on physical protection related people, not for all facility employees. More efforts to upgrade these programs for a strong security awareness are needed.

Information on security measures or sensitive targets could help insiders successfully to perform a malicious act. Some of this information is identified and classified by the nuclear licensees, but most of the information is not. So the nuclear licensees should identify what information should be classified and determine how to protect it.

3.2 Protective measures

The term 'protective measures' is used to describe measures to detect, delay, and respond to malicious acts that are carried out, and to mitigate or minimize their consequences [3].

In the case of outsiders, the physical protection system is focused on the barrier of protected area and the outsider's penetration could be detected on the protected area layer. It is more difficult to detect the insider's malicious acts. Insiders may be able to bypass physical protection system which is designed and operated focus on outsiders.

To protect sensitive areas, such as a vital area, quite a number of doors are currently locked and detecting against unauthorized access using electromagnetic lock and balanced magnetic switch. However, the access classification is not based on the function or roles of each areas or workers. The access level should be more analyzed and reclassified based on the access history and needs.

CCTV installed in some vital areas could monitor the area and workers' unauthorized act. However, the CCTV is for watching the conditions of equipment or system. The operator who monitor the CCTV is focused on safety measures. Facility operators should monitor sensitive equipment, systems or devices to verify the safety of the facility. These monitor indicators are activated by the malicious acts of insiders as well. Therefore, more efforts for extension of security awareness of the operators are needed. Many safety measures could be used to detect malicious acts of insiders.

Delay is the slowing down of adversary progress, and can be accomplished by people, barriers, locks, and activated delays [4]. Most barriers are focused on delaying penetration of outsiders, rather than delaying the malicious act of insiders. And currently there is no delay systems in the facility. Multiple layers and procedural barriers for access sensitive area or separation of access authorization could delay insider's malicious acts. Some kinds of safety systems for self-protection, such as redundant equipment, automatic equipment shutdown and automatic valve closure, could make insiders complicated to defeat multiple redundant and dispersed facilities and equipment.

Response to a malicious acts by an insider is difficult. A malicious act committed by an insider can consist of several acts separated in both time and space. And identifying insider among the workers is hard.

4. Conclusions

Physical protection systems for current nuclear facilities are designed and operated against outsider threat. The insider threat is more difficult to find and respond. And the consequences by the malicious acts of insiders could cause more social impacts.

Some physical protection measures could be used against insiders such as conducting trustworthiness assessment, escort and surveillance, security awareness program, information control, access control, and using safety systems/procedures, etc. However, many of them should be modified and redeveloped. Especially, there is no physical protection measures for responding to a malicious acts by insiders, and more researches for finding insiders and mitigate or minimize the radiological consequences of sabotage are needed.

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