

Hungarian Atomic Energy Authority

Physical protection requirements for new nuclear power plant units

- PP-17 Draft guideline -

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Introduction

The legal hierarchy of security regulations for nuclear facilities, nuclear and other radioactive materials is as follows:

1. The internationally accepted basis of physical protection is represented by the Law Decree 8 of 1987, which promulgated the Convention on Physical Protection of Nuclear Materials approved by the IAEA in 1979 and by the Act LXII of 2008, which promulgated the Modification of the Convention signed on July 8, 2005 in a diplomatic conference organized by the IAEA.
2. The uppermost level of domestic application of the obligations undertaken in the international convention is represented by the Act CXVI of 1996 on Atomic Energy (hereinafter referred to as: Atomic Act). The Atomic Act contains the basic concepts of nuclear security and establishes the basis for detailed regulation of physical protection.
3. Govt. Decree 190/2011. (IX. 19.) Korm. on physical protection requirements for various applications of atomic energy and the corresponding system of licensing, reporting and inspection issued as an executive order of Paragraphs q) and r) of Section 67 of the Atomic Act is the next level of the regulation system.
4. The methods how the requirements determined in the laws should be complied with are described in the *guidelines* that constitute the next level of the regulatory system. The guidelines are issued by the director general of the HAEA, and they are regularly reviewed and reissued based on accumulated experience. So as to proceed smoothly and duly the authority encourages the licensees to take into account the recommendations of the guidelines to the extent possible.

Before applying a given guideline, always make sure whether the newest, effective version is considered. The valid guidelines can be downloaded from the HAEA's website: <http://www.haea.gov.hu>.

This document summarizes the physical protection requirements to be considered during the design of new nuclear power plants.

The guideline does not discuss in detail the requirements for the implementation and operation of the physical protection system, which are discussed in detail in other law and guidelines.

PP-8 Guideline provides support to the design of the physical protection system of nuclear facilities (with the exemption of those operating a reactor having less than 1 MW thermal power).

II. Physical protection requirements

II.1. Goal

The goal of physical protection is to prevent (deter), detect, delay and respond to

- (1) sabotage acts entailing radiological consequences,
- (2) the unauthorized removal of nuclear and other radioactive materials,
- (3) the unauthorized access to sensitive data and information

on the site of the facility, as well as during the use, storage and transport of nuclear and other radioactive materials.

The physical protection of the nuclear facility, as well as the nuclear and other radioactive materials used and stored on its site is provided by a complex system consisting of technical means, administrative procedures and live guards.

This guideline describes those fundamental requirements against the physical protection system of the facility, which are to be taken into account even during the design of the facility.

II.2. Fundamental requirements for the physical protection of a new nuclear facility

The physical protection requirements shall be based on a graded approach, taking account of the current threat, the applicability of the nuclear and other radioactive materials to build a nuclear or radiological weapon or to cause public danger or environmental damage, the physical and chemical properties of the material, as well as the potential consequences associated with the unauthorized removal of the materials or with a sabotage against nuclear and radioactive materials or facilities.

Accordingly, the danger categories of nuclear and other radioactive materials intended to be used in the facility planned to be constructed on the site should be determined, as well as the physical protection requirements established in the relevant laws should be identified.

Fundamental principles:

- (1) The physical protection system is capable of providing effective protection against acts within the design basis threat and so preventing unacceptable consequences.
- (2) The nuclear facilities (with the exemption of those operating a reactor of less than 1 MW thermal power), and the nuclear material in Category I and II should be protected by armed security guards.
- (3) The physical protection system should be able to effectively and timely deter, detect, delay and respond to adversary acts derived from the design basis threat in a way that the requirements for the minimum physical protection levels associated with the danger caused by the materials to be protected should also be complied with.
- (4) The physical protection system should take into account the importance of the equipment to be protected, the danger of the materials to be protected, the operational states of the facilities and the potential environmental consequences.
- (5) The physical protection system should apply the defence in depth approach; the defence lines should be independent of each other, and almost equal protection should be provided on the advisory access routes.
- (6) The harmony of deterrence/prevention, recognition/detection, delay and response physical protection functions should be provided.

The physical protection system implemented by the licensee should be able to effectively respond to the design basis threat established for the specific material and facility. Consequently, after the detection of the attempt of unauthorized removal or sabotage and the subsequent alarming the technical barriers applied should provide sufficient delay, and sufficient response force having sufficient equipment should arrive to the scene in order to intervene and prevent the adversary act in time.

The design basis threat of the new facility is established at the request of the licensee by the Authority according to the law. The relevant application should be submitted together with the construction license application . The Authority should establish and provide the specific design basis threat within 6 months to the licensee. Subsequently, the Physical Protection Plan of the facility should be submitted for licensing to the Authority within 6 months. The license for the implementation of the physical protection system according to the physical protection plan of the licensee is granted by the Authority together with the construction license of the nuclear facility.

The specialities of the site determine the specific elements of the physical protection system to be implemented (e.g. deterrence means, realization of delay, applicable detection instruments, capabilities of the off-site response forces, duration needed for their arrival); the Authority should therefore consider the topography, meteorology, environmental and accessibility specialities of the site during the establishment of the specific design basis threat.

Consequently, in addition to the analysis of the technology and materials to be applied, the licensee should present, in the above described application, the analysis of the suitability of the site from physical protection point of view.

The primary responsibility for the implementation of an effective physical protection system rests with the licensee. The physical protection of the licensee should be supported with state forces (primarily by military or police forces) in the case of threats requiring stronger physical protection than the design basis threat (greater number of adversary force, adversary force with better capabilities, planning of sabotage instead of unauthorized removal). The threats beyond the design basis threat and the protection against them, as well as the capabilities expected from state organization should also be assessed.

II.2.1. Physical protection related applicability of the site

The suitability of the selected site should be demonstrated based on the credible threats, adversary pathways and tactics, according to the following viewpoints.

(1) Topography of the site

The topography of the site should be assessed from the aspects of visibility from outside, hidden access, potential issues during realization of external physical barriers (fence, access/regress points) and of area protection.

(2) Meteorological conditions of the site

The potential extreme meteorological conditions on the site should be assessed from the aspect whether they could have influence on the continuous provision of effective physical protection.

(3) Use of the surrounding area, its population and economical activity

The use of the area directly surrounding the proposed site, as well as the areas of public stay and the entailed risks should be assessed. The influence of the economic activities in the wider environment of the site (e.g. hazardous facilities, airports, plants) on physical protection of the late facility should be assessed.

(4) Accessibility of the site

It should be assessed whether the off-site response forces are able to arrive to the site and respond to the adversary action in time.

(5) Adversary access routes to the site

The suitability of the proposed site should be evaluated in the mirror of accessibility, potential adversary access routes, adversary tactics and their consequences as well. The scope of the assessment should cover the following access routes:

- via water,
- via public road and rail,
- via air.

It should be demonstrated based on the assessment that effective physical protection complying with the requirements for nuclear facilities and repositories can be implemented on the proposed site.

II.2.2. Reactor type

Being aware of the type and service modes of the reactor to be operated in the nuclear facility the systems and components having significance from the aspect of radiological consequences and the access modes thereto should be identified.

The systems and components having significance from the aspect of radiological consequences should be protected at the same physical protection level as the applied nuclear or other radioactive material.

II.2.2. Use and storage of nuclear and other radioactive materials

The highest physical protection level to be applied in the nuclear facility depends on the type and quantity of the used or stored nuclear and other radioactive materials.

Based on the above data, the categories of the used or stored nuclear material, radioactive source and radioactive waste should be determined, and then the required physical protection level should be identified based on the categories.

II.2.3. Transport of nuclear and other radioactive materials within the site

Every movement and transport route of nuclear and other radioactive materials should be identified within the site.

The movement routes of nuclear materials should be planned in such a way that the materials should not leave the physical protection zone, which is in compliance with the physical protection level required by the category of the materials. If the above requirement cannot be met, then the transport requirements for the materials should be complied with.

3. Classification of data

The recommended classification levels and their justification to be considered during the classification of physical protection plans of nuclear facilities and nuclear material transport including data in relation with the internal procedures, the realization and operation of the

technical system and the cooperation with external organizations are indicated in the below table.

Classification levels

Public duty	Public interest to be protected	Classification level	Justification (if released, then...)
Fulfilment of international obligations in relation to the physical protection of nuclear facilities	National defence Crime prevention	Secret	<ul style="list-style-type: none">– Causes direct hazard to life– Threatens the safety systems of nuclear facilities– The physical protection requires significant extra costs– Causes stress in the relations between Hungary and other countries
Transport of nuclear materials in Category I, II and III	National defence Crime prevention	Confidential	<ul style="list-style-type: none">– Significantly hinders the execution of the transport– The physical protection requires significant extra costs– Causes stress in the relations between Hungary and other countries

Accordingly, the analyses supporting the compliance with the physical protection requirements are to be protected with secret classification; the recommended duration of the maintenance of the classification is 30 years.