

## APPLICATION OF CONFLICTOLOGY METHODS FOR EVALUATING PHYSICAL PROTECTION SYSTEMS EFFECTIVENESS

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At present, physical protection of nuclear material and nuclear facilities is actual. For the implementation of physical protection, Physical Protection System (PPS) is created at nuclear facilities. We all know that the most important characteristic is effectiveness of physical protection systems. PPS effectiveness value is determined by the probability that reaction forces can stop and intercept the intruder. There are many methods to assess the effectiveness of PPS. However, not all methods can provide an accurate quantitative assessment of the effectiveness of security systems. This work presents an approach for assessing the resistance of PPS to emerging threat (that is, the intruder to act against items of physical protection). Based on the fact that different processes are subject to universal physical laws and principles of development, a parallel between the concepts of Conflictology field was established to describe the interaction in the system «intruder against PPS».

Keywords: physical protection system, the effectiveness of the physical protection system, intruder, threat, conflict, Conflictology.

### Introduction

Currently there are many methods of analysis and safety assessment of the physical object, along with the methods for assessing the effectiveness of physical protection systems. In this paper concepts of Conflictology, which studies the laws of the origin, development, conflict settings, where the conflict means the most acute way of resolving contradictions were used for evaluating the effectiveness of the physical protection. As the object of conflict resolution conflict «man – system» will be used, where a person will act as offender, and under the system we mean a system of physical protection. Based on the availability of explicit confrontation of the offender and the protection system this method of assessment was chosen.

Goal of this paper is introduction to the basic concepts of conflictology and application of acquired knowledge to assess the effectiveness of physical protection systems.

Objectives are:

- estimation of methods and approaches to evaluation of safety in terms of Conflictology;
- using Conflictology methods for assessment actions of intruder and security system;
- analyzing the role of a person in the PPS;
- studying personal and behavioral parameters of the person in terms of Conflictology;
- exploring ways to control and training of these parameters.

### Development and methodology

The basis of the approach is the use of the concepts of conflictology. It is a science which deals with the study of the laws of appearance, development and completion of the conflict. In this case, the conflict is a confrontation between the intruder and the physical protection system. Basic concepts of conflictology,

dynamics of the conflict and its major components, such as subject and object were the part of this work. Also it is devoted to the development of conflict in some temporal boundaries. Each of the selected stages of the conflict has individual characteristics, which allowed binding all of the interactions in the "offender against PPS" system to a particular stage of the conflict.

This connection was the basis for creating a mathematical model to estimate the rate of increase of the unauthorized act commission threat at a nuclear facility. In addition, this model allows identifying areas where PPS operates less efficiently and allows acting appropriately to improve it in the future.

In addition to the mathematical model this work deals with the human impact on system performance. In this situation, the increase of the effectiveness of security systems with the influence of human factor is a priority. Currently PPS at nuclear facilities are automated control systems. Central control operator is primarily responsible for their proper functioning. This person (operator) has a certain type of personality and character traits, individual manners of behavior and psychological state. In this case allocation of such basic characteristics as its readiness to work in-house, as well as in emergencies, stressful situations is necessary. It becomes important that employees have the necessary psychological and physiological characteristics that are favorable to effective and efficient work in emergencies. After all, on the reaction rate, the ability to adequately assess the situation and emotional stability of the operator's physical protection system depends on the speed of processing and transmission of alarm response forces. This significantly reduces the time to respond to emerging unauthorized actions on the nuclear facility and allows acting more quickly and effectively in cases of interception so that to neutralize the intruder. These actions eventually determine the effectiveness of PPS as a whole. To resolve identified issues some ways can be suggested to improve and develop the necessary positive qualities through training personnel with different characteristics and trends.

Now we are working on the formation of some effectiveness indicators and indices of physical protection systems. Under the indicators characteristics of the component parts of the physical protection system are understood, and under performance - characteristics of the offender, which includes not only a model offender, equipment and tactics actions, but also his actions in the process of committing unauthorized actions, which can help to successfully overcome the physical protection system and to achieve the goal. This system of criteria (indicators and indices) and their interaction will be the basis for further creation of a software product designed to simulate theft and sabotage at a nuclear facility. Through this modeling, the effectiveness of the physical protection system will be assessed.

#### Conclusion

The result of this work is a graph, which shows the relationship between risk and offender's actions, which were classified by using the concepts of Conflictology on temporary stages. Thus, the direct link has been established between the actual potential conflict of "man - the system" and the concepts of Conflictology. With this dependence the rate of rise and the threat changes can be estimated thereto from the slope of the theoretical curve; and as a result, we can evaluate the effectiveness of the physical protection system, not only in general, but also at each stage. We can also identify weaknesses and take the necessary measures to improve performance. In addition, the result of this work is a model of conflict analysis, which can be used to analyze the dynamics of theft and sabotage at a nuclear facility. Evaluating method development of PPS effectiveness based

on an assessment of personal and behavioral qualities operator PPS was initiated.

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