

Significance and Challenges of Physical Protection Systems Effectiveness Evaluation for Nuclear Material and Nuclear Facilities

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Provision of nuclear materials and nuclear facilities physical protection is an essential part of nuclear activity. This statement mentioned in many IAEA International Documents. In particular those documents also mentioned that modern physical protection systems (PPS) creation should be based on their effectiveness evaluation. It is necessary to understand how nuclear materials and nuclear facilities protection have been enhanced for some financial and human resources investment into PPS upgrading. This paper analyzes IAEA Nuclear Security Series (NSS) documents (NSS 13 “Nuclear security recommendations on physical protection of nuclear material and facilities (INFCIRC/225/Rev.5)”, NSS 14 “Nuclear security recommendations on radioactive material and associated facilities”, NSS 27 “Physical Protection of Nuclear Material and Nuclear Facilities (implementation of INFCIRC/225/Rev.5)”) requirements concerning physical protection systems effectiveness evaluation. The paper views methods that were developed under Coordination Research Project (CRP) “Nuclear Security Assessment Methodology (NUSAM)” (2014-2016). Russian theoretical and practical experience in this area viewed as an example. It’s also mentioned evaluation methods were developed only in relation to physical protection systems but similar methods for following nuclear security subsystems (cyber-security etc.) are absent. Besides necessity of such methods development here viewed other perspective research trends. In particular here proposed to consider modern threats in detail (for example, unmanned airborne vehicles, divers, modern software/hardware used by intruder etc.) and their influence on nuclear facilities physical protection effectiveness. Furthermore the paper encourages other perspective research trends in this area: distribution of developed effectiveness evaluation methods to radioactive materials and associated facilities, human factors taking into account in physical protection systems effectiveness evaluation, optimization methods development for PPS design process (for example, by “cost-effectiveness” criteria), risk assessment methods development etc.

Key words: nuclear material, nuclear facility, physical protection, physical protection system, effectiveness evaluation

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