

## ENSURING SECURITY WHEN USING RADIOACTIVE MATERIALS IN A RADIOLOGICAL FACILITY

Ansah M.N.S., Amoah P.A.

Scientific supervisor: Stepanov B.P.

Tomsk Polytechnic University, 634050, Russia, Tomsk, Lenin Avenue, 30

E-mail: [michaelansah67@gmail.com](mailto:michaelansah67@gmail.com).

The number of radioactive materials used in the radiological facilities around the world demands for an effective security to be put in place. Ensuring the safe operation of facilities that uses radioactive materials has always been priority of States, personnel and the general public. The main idea is to keep these operating radiation installations against growing terrorist threats and possible theft. Physical protection systems, fire safety, radioactive security, accounting and control of radioactive materials are practiced at radiological facilities to prevent any unauthorized actions from an outsider or even a worker of such facility. A Physical Protection System (PPS) is usually designed and implemented into these facilities to protect radioactive materials from adversaries which pose as possible threats. The purpose of the work is to articulate security requirements for handling radioactive materials at a radiological facility.

The evaluation of physical protection system designed for a hypothetical radiological facility against unauthorized actions is presented. In this research an Adversary Sequence Diagram (ASD) is developed and effective of physical protection system is assessed through the use Estimate of Adversary Sequence Interruption (EASI model) for interruption of adversary action on a radiological facility. The estimated value of total probability of interruption  $P_I$  is calculated using the relation:

$$P_I = 1 - B_D$$

$B_D$  is the combined non-detection probability which describes the probability that adversaries will not be defeated.

The resulting probability of interruption associated with the facility according to the selected path of the adversary is 0.486. After the improvement in some security measures put in place at the oncological center and running then model again, the probability of interruption for the facility increased to 0.565. The probability of interrupting the activities of an adversary abruptly towards the hypothetical radiological facility was increase by 7.9% indicating that the PPS provided for the hypothetical radiological facility has been improved in terms of reliability. It may be a valuable guiding principle for decision-makers when establishing adequate security requirements for handling radioactive materials for a radiological center.

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