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Security Hardening of Radiation Equipment “”Gamma Chamber”

Board of Radiation and Isotope Technology (BRIT) is engaged in production and supply of various radiation based equipment such as laboratory irradiators, blood irradiators, radiography devices etc. These devices are used in various institutions such as university, hospital and industries. Different sources such as Co-60, Ir-192 and Cs-137 etc. are used in these devices. These radiation based devices with source are transported in the public domain and they are kept in the universities, research center, hospitals etc. without much security. Hence, these radiation devices are much more vulnerable to sabotage than other devices which remain in nuclear establishments. Security of sources in these devices becomes more important. Graded approach has been followed in the design with the principle of deter, detect & delay to enhance the security of these sources. It is important to ensure securities of these sources not only during transportation but also at the installation site. Different design features are being incorporated in various new devices manufactured by BRIT to increase the adversary time.

Gamma Chamber which is widely used in universities and hospitals & research institutions was studied for its security hardening. These equipment are self-shielded devices in which a number of Co-60 source pencils are placed in a cylindrical cage. The Gamma Chambers are type approved as equipment and as a transportation package conforming to various national and international safety standards. But these Gamma Chambers were not earlier designed keeping in view the security aspects which has become more relevant now. There is need to secure such devices against different malicious acts. The acts may include theft of the radioactive material or attempt to break the shielding with the aim to spread the radioactive material. A mock drill was conducted to remove the sources from the Gamma Chamber at the installation site. Two people were given a basic idea of the equipment, a few tools and a drawing to take away the source and record the adversary time. Based on the mock drill a number of design features such as hidden fasteners, higher number of fine threaded screws, stopper plug, specialized tool for removing radiation source etc. are incorporated.

This paper covers details on the mock drill conducted on the Gamma Chamber and a number of modifications which have been carried out in the design of these equipment to increase the adversary time such that it is greater than the expected response time. The study will help in design modification of similar equipment carrying radioactive material.

Keywords: Gamma Chamber, Response time, Adversary time

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