

Evaluation of the Contribution of Capture Gamma Rays, X-ray Leakage, and Scatter to the Photon Dose at the Maze Door of a High Energy Medical Accelerator Room

The photon dose in the entrance maze of an 18 MV accelerator room was investigated by means of Monte Carlo simulations and experimental measurements. The Monte Carlo simulations were carried out using MCNP version 4B. Based on the Monte Carlo evaluation and measurements, it was found that the photon dose can be represented by the sum of two exponential functions of distance along the maze centerline. The dose due to head leakage and scattered x-rays was found to be insignificant compared to the dose due to capture gamma rays for mazes with length greater than 3 meters. It was concluded that the photon shielding requirements for the maze door are dictated primarily by capture gamma rays produced by thermal neutron interactions with the materials used to construct the maze.