ABSTRACT

Evaluation of radiation protection system design in high-energy radiotherapy facilities is very important to ensure the safety of radiation workers, patients, and public from the potential dangers of radiation exposure. This study aims to assess the effectiveness of the shielding design and bunker door of the Linear Accelerator (Linac) in the Radiotherapy Unit Primaya Hospital Bekasi Barat. This study evaluates the bunker structure using a Linac Shinva XHA-1400 machine with a maximum energy of 10 MV by following the international standards of IAEA Safety Report Series No. 47 and NCRP Report No. 151. The bunker's primary and secondary wall thicknesses were calculated using the working load method and the instantaneous dose rate (IDR) limit. The time-averaged dose rate (TADR) and the potential impact of skyshine photon and neutron radiation were also calculated to ensure compliance with regulatory dose limits (BAPETEN). The calculation results show that the planned concrete thickness with a density of 2.35 g/cm³ on the primary, secondary walls and roof of the bunker can reduce radiation exposure to below the dose limit value. The bunker door is designed with a sandwich configuration of 8.5 mm thick lead (Pb) and 55 mm Borated Polyethylene (BPE) which has been proven to be effective in absorbing gamma radiation and secondary neutrons in the maze entrance area. Evaluation of the potential skyshine radiation of photons and neutrons outside the bunker area also showed values that were below the specified dose limit values. Overall, the design of the Linac bunker at the Radiotherapy Primaya Hospital Bekasi Barat meets operational safety standards, as all radiation exposure parameters remain below the safe dose limits for both workers and the general public.

*Keywords**:** Radiotherapy Shielding, Linac Bunker, Door and Maze Bunker, Skyshine Radiations*