GAMMA AND NEUTRON MAZE EFFICIENCY ENHANCEMENT

Omi, N. M., Rodrigues Jr., O., Calvo, W. A. P., Rela, P.R.

nminoru@ipen.br

Instituto de Pesquisas Energéticas e Nucleares (IPEN-CNEN/SP),Av. Prof. Lineu Prestes, 2242
05588-900, São Paulo, SP, Brazil

The design of radiation bunkers is based on the existence of thick walls and mazes, ducts with bends, in penetration points. These mazes tend to have traditional designs with three or more bends with plain finished walls, penetrating the bunker walls with low radiation transmission rate. The traditional designs require wide installation footprints and long transport systems, following the respective maze. Reducing the radiation transmission of each bend, it's possible to reduce the amount of curves and the length of their ducts, or legs, to reach the desired maze radiation transmission rate. Minimizing the maze legs can reduce significantly the costs of the installation construction and maintenance. The proposed maze modifications, effective for gamma and neutron fluxes, have the radiation transmission many times lower than a traditional maze with the same duct number and lengths. The main purpose of this work is to show that it is possible to enhance the maze efficiency to reduce the radiation transmission adopting radiation "traps". Each "trap" have to be optimized for the radiation source and maze section. As example, the efficiency enhancement of one of these modifications for gamma radiation is determined by comparative simulations. The results of Monte Carlo simulations are presented in this work.

Keywords: gamma, neutron, maze, efficiency, enhancement