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Investigation of Cost Effective Double Layered Slab for γ-Ray Shielding

Authors : Kulwinder Singh Mann, Manmohan Singh Heer, Asha Rani

Abstract : The safe storage of radioactive materials has become an important issue. Nuclear engineering necessitates the safe handling of radioactive materials emitting high energy gamma-rays. Hazards involved in handling radioactive materials insist suitable shielded enclosures. With overgrowing use of nuclear energy for meeting the increasing demand of power, there is a need to investigate the shielding behavior of cost effective shielded enclosure (CESE) made from clay-bricks (CB) and fire-bricks (FB). In comparison to the lead-bricks (conventional-shielding), the CESE are the preferred choice in nuclear waste management. The objective behind the present investigation is to evaluate the double layered transmission exposure buildup factors (DLEBF) for gamma-rays for CESE in energy range 0.5-3MeV. For necessary computations of shielding parameters, using existing huge data regarding gamma-rays interaction parameters of all periodic table elements, two computer programs (GRIC-toolkit and BUF-toolkit) have been designed. It has been found that two-layered slabs show effective shielding for gamma-rays in orientation CB followed by FB than the reverse. It has been concluded that the arrangement, FB followed by CB reduces the leakage of scattered gamma-rays from the radioactive source.

Keywords : buildup factor, clay bricks, fire bricks, nuclear wastage management, radiation protective double layered slabs
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