

INTISARI

PEMODELAN PERISAI RADIASI NEUTRON FASILITAS RUANGAN IRADIASI *BORON NEUTRON CAPTURE THERAPY* DENGAN SUMBER *BEAMPORT* TEMBUS REAKTOR KARTINI MENGGUNAKAN SIMULATOR *MONTE CARLO N PARTICLE EXTENDED*

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Telah dilakukan pemodelan perisai radiasi neutron untuk fasilitas *Boron Neutron Capture Therapy* (BNCT) pada sekeliling ruangan iradiasi. Pemodelan mencakup pemilihan bahan dan tebal yang digunakan untuk perisai radiasi. Perisai diharuskan mampu menahan radiasi yang keluar ruangan sehingga dosis radiasi berada di bawah ambang dosis bagi pekerja radiasi sebesar 20 mSv/tahun. Bahan yang dipertimbangkan adalah beton barit, *paraffin*, *stainless steel* 304 dan timbal. Perhitungan laju dosis neutron epitermal dilakukan dengan menggunakan program *Monte Carlo N Particle Version Extended* (MCNPX) dengan batasan laju dosis radiasi kurang dari 10 μ Sv/jam untuk asumsi perhitungan waktu kerja 8 jam per hari dan 5 hari per minggu. Desain pertama dari empat desain yang telah dibuat kemudian dipilih sebagai desain yang direkomendasikan dengan laju dosis di bawah batas ambang 10 μ Sv/jam. Ruangan iradiasi memiliki dimensi panjang 30 cm, lebar 30 cm dan tinggi 30 cm. Lapisan utama perisai pada desain pertama berbahan *paraffin* setebal 68 cm pada sisi kiri dan bawah ruangan, 70 cm pada sisi kanan ruangan, 45 cm pada sisi depan ruangan dan 67 cm pada sisi atas ruangan. Parafin setebal 15 cm dan 10 cm ditambahkan sebagai peredam intensitas radiasi primer dari *beamport* tembus yang masih cukup besar.

Kata kunci: Perisai radiasi, BNCT, MCNPX, laju dosis radiasi, *beamport* tembus

ABSTRACT

MODELING OF NEUTRON RADIATION SHIELD OF BORON NEUTRON CAPTURE THERAPY IRRADIATION ROOM FACILITY WITH PIERCING BEAMPORT SOURCE ON KARTINI REACTOR USING MONTE CARLO N PARTICLE EXTENDED

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The study to optimise a model of neutron radiation shielding for BNCT facility in the irradiation room has been done. The collimator used in this study is predesigned collimator from earlier studies. The model includes the selection of the materials and the thickness of materials used for radiation shielding. The radiation shielding is required to absorb leaking radiation in order to protect workers at the threshold dose 20 mSv/year. The materials considered were barite concrete, paraffin, stainless steel 304 and lead. The leaking neutron radiation dose rate has been determined using Monte Carlo N Particle Version Extended (MCNPX) with radiation dose limit rate is less than 10 μ Sv/hour, with assumption of working time is 8 hours per day and 5 days per week. The best model which been chosen as a recommendation model for the irradiation room has dimension 30 cm width, 30 cm length, 30 cm height and the main layer of irradiation room shielding material is paraffin with 68 cm thick at the left and below of the irradiation room, 70 cm thick at the right of the irradiation room, 45 cm thick at the front of the irradiation room and 67 cm thick at the top of the irradiation room. The additional layers were used to parafin with 15 cm and 10 cm thick to reduce the intensity of primary radiation from piercing beamport after two primary layers. There is no neutron radiation that leakage in this model.

Kata kunci: Radiation shielding, BNCT, MCNPX, radiation dose rate, piercing beamport