Analisis kecelakaan dari aspek tekanan gas pada subcritical assembly for Mo99 production (SAMOP) dengan kode MCNPX

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ABSTRAK

Indonesia through its Centre of Accelerator Technology Studies of National Atomic Energy Agency is designing SAMOP system to answer the future's challenge of increasing demand of ^{99}Mo as the most used isotope in nuclear medicine. The SAMOP system is a subcritical system fueled by uranium nitrate which utilizes Kartini reactor's beam port as the neutron. One of the problems in using uranium nitrate fuel is the radiolysis reactions and gaseous fission products that formed in the cavity above SAMOP fuel tube, which build pressure. This study aims to calculate the total accumulated gas pressure in each SAMOP tube contributed by gaseous fission products, and water radiolysis by neutron and gamma radiation during 7 days of operation. Calculations were performed by combining SAMOP and Kartini reactor's geometry to obtain the burn up power. The SAMOP system were then simulated for 7 days with the obtained burn up power with F6 and F7 tallies of the MCNPX code. Outputs from the code were then calculated and analyzed to determine the total accumulated pressure on each fuel tube from each of the pressure contributors. This research shows that the maximum accumulated pressure is 0.38 atm and 0.43 atm for Kartini's power of 100 kW and 110 kW, respectively. These pressures are lower than the atmospheric pressure, hence the current SAMOP system can be operated safety.

Kata Kunci: *MCNPX, SAMOP, radiolysis gas pressure, gaseous fission products, F6 tally*