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LEMBAR ABSTRAK

Rosilatul Zailani, Gani Priambodo, Yohannes Sardjono., *Neutron and GAMMA Spectrum Analysis of Kartini Research Reactor for Boron Neutron Capture Therapy (BNCT)*. Jurnal Teknologi Reaktor Nuklir TRI DASA MEGA, 20 (2), 59.

MCNPX was used to design a three-dimensional model of Kartini Research Reactor (KRR) as a neutron source and performed criticality calculation. The criticality calculation of the reactor aims to obtain the neutron and gamma spectrum by simulating the fission reaction inside the reactor core. Total source histories were 105 per cycle, when the number of cycle for criticality calcutation was 1000 cycles with 60 skipped cycles. The reactor criticality according to the simulation result is 1.00179±0.00007. The total neutron flux on ring A, B, C, D, E and F inside the reactor core are respectively *6.553×10^{11} n/cm^{2}s, 4.53×10^{12} n/cm^{2}s, 4.167×10^{12} n/cm^{2}s, 3.751×10^{12} n/cm^{2}s, 2.914×10^{12} n/cm^{2}s and 3.107×10^{12} n/cm^{2}s. The total gamma flux is 6.956×10^{11} particles/cm^{2}s, 4.838×10^{12} particles/cm^{2}s, 4.398×10^{12} particles/cm^{2}s, 3.962×10^{12} particles/cm^{2}s, 2.953×10^{12} particles/cm^{2}s and 2.013×10^{12} particles/cm^{2}s, respectively for each ring. Thermal neutron fluxes recorded on the base of radial piercing beamport were 4.678×10^{10} n/cm^{2}s, with the epithermal neutron flux of 5.37×10^{9} n/cm^{2}s and fast neutron flux of 4.17×10^{10} n/cm^{2}s. The gamma flux on that side reaches 4.22×10^{12} particles/cm^{2}s. On the 92-cm-ranges from the base inside radial piercing beamport, both neutron and gamma flux decrease up to 5.11×10^{8} n/cm2s for thermal neutron flux, 4.598×10^{6} n/cm^{2}s for epithermal neutron flux, 2.55×10^{7} n/cm^{2}s for fast neutron flux and 8.214×10^{10} particles/cm^{2}s for gamma flux. In conclusion, the spectrum yield from this study can be use to define the source spectrum of the simulations and optimations prior to BNCT pre-clinical trial (in vivo/in vitro test) use KRR radial piercing beamport.*
Keywords: BNCT, radial piercing beamport, Kartini Research Reactor, neutron spectrum, gamma spectrum.

Ihda Husnayani, Pande Made Udiyani**.,** *Radionuclide Characteristics of RDE Spent Fuels.,* Jurnal Teknologi Reaktor Nuklir TRI DASA MEGA, 20 (2), 69.

Reaktor Daya Eksperimental (RDE) is a 10 MWth pebble-bed High Temperature Gas-cooled Reactor that is planned to be constructed by National Nuclear Energy Agency of Indonesia (BATAN) in Puspiptek complex, Tangerang Selatan. RDE utilizes low enriched UO_2 fuel coated by TRISO layers and loaded into the core by means of multipass loading scheme. Determination of radionuclide characteristics of RDE spent fuel; such as activity, thermal power, neutron and photon release rates; are very important because those characteristics are crucial to be used as a base for evaluating the safety of spent fuel handling system and storage tank. This study is aimed to investigate the radionuclide characteristics of RDE spent fuel at the end of cycle and during the first 5 years cooling time in spent fuel storage. The method used to investigate the radionuclide characteristics is burnup calculation using ORIGEN2.1 code. In performing the ORIGEN2.1 calculation, one pebble fuel was assumed to be irradiated in the core for 5 cycles and then decayed for 5 years. At the end of the fifth cycle, it is obtained that the total activity, thermal power, neutron production, and photon release rates from all

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radionuclides inside one spent fuel are approximately 105.68 curies, 0.41 watts, 2.65 x 10^3 neutrons/second, and 1.79 x 10^4 photons/second, respectively. The results for the radionuclides characteristics during the first 5 years cooling time in the spent fuel storage show that the radioactivity characteristics from all radionuclides are rapidly decreasing at the first year and then slowly decreasing at the second until the fifth year of cooling time. The results obtained in this study can provide data for safety evaluation of fuel handling and spent fuel storage, such as the calculation of sourceterm, radiation dose rate, and the determination of radiation shielding.
Keywords: RDE, spent fuel, radionuclide activity, thermal power, neutron production, photon releaserates.

Entin Hartini, Sukmanto Dibyo, Santosa Pujiarta., *Determination of Maintenance Priority Index (MPI) for Components on RSG-Gas Safety System*. Jurnal Teknologi Reaktor Nuklir TRI DASA MEGA, 20 (2), 77.

Reliability management is an activity to ensure no failure of all equipment when operated. Reliability management can be optimized to minimize costs or eliminate failures and causes. Critical equipment is the condition of a potentially damaging component affecting the operational reliability of the system. The criticality level of each equipment determines its impact on the operating system and the direction of maintenance improvement. The research was conducted on the main system/component of the operating system and performed at the level of reliability improvement. The purpose of this research is to prioritize the reliability of systems and equipment for safety systems using System & Equipment Reliability Prioritization (SERP). Determination of component criticality level on reliability management based on category rankings of frequency data and duration of interference with certain criteria as well as system aspects, safety, quality and cost. From the evaluation results it can be concluded that the MPI of the RSG-GAS system/ component for the top 5 if sorted are KBE01 AP-01-02, PA01-02 / CR001, KBE02 AA-01/ AA-02, JE-01 (AP01-02) and JNA10 / 20/30 BC001 with MPI values 143,101, 95, 90 and 60.
Keywords: Maintenance, priority, index, safety system, RSG-GAS

Sriyono, Topan Setiadipura, Geni R. Sunaryo., *Carbon Dust in Primary Coolant of RDE: Its Problem and Solution*., Jurnal Teknologi Reaktor Nuklir TRI DASA MEGA, 20 (2), 89.

There are two kinds of impurities in primary coolant of Reaktor Daya Eksperimental (RDE) i.e. gaseous and particulate impurities. Carbon dust as a particulate impurity is generated from abrasion of pebble friction in the core and friction between pebble and refueling pipelines. Due to negative impact to the system, structure and component (SCC), therefore carbon dust must be removed from primary coolant. This paper discusses the carbon dust removal in RDE. The objected of the research is to analyze the helium purification system (HPS) capability of removing carbon dust through particle size distribution analysis. The carbon dust size particle varies from 0.1 µm up to 10 µm regarding to the experiences of high temperature gas cooled reactor (HTGR) operation. Three models have been made by using ChemCAD. First model was using single filter, second model was using 2 filters in series and the last one was using both double filters in series and cyclone. The dust removal total efficiency of first model is 88.70 %, the second model is 98.10% and the last one is 98.89%. The highest efficiency of 98.98 % was achieved in the model that used both double filters and cyclone. The cyclone should be installed in HPS of RDE if there are coarse carbon dust particle, which was found in the primary coolant to increase its dust removal capability.
Keywords: Carbon dust problem, primary coolant, particle size distribution, RDE

Rahayu Kusumastuti, Sumaryo, Sriyono., *Effect of Dukem Inhibitor on AISI 1010 in the Secondary Cooling System of RSG GAS.* Jurnal Teknologi Reaktor Nuklir TRI DASA MEGA, 20 (2), 99

The secondary coolant of RSG GAS is an open system whose components are easy to interact with oxygen from surrounding environment to initiate corrosion. Corrosion controls are usually done by adding inhibitors. Dukem inhibitors are one alternative substitute inhibitor that may be used in the secondary cooling system of RSG GAS. The purpose of this study is to find out the optimum dukem concentration that needs to be added to RSG GAS secondary cooling system and to understand the interaction phenomenon between dukem inhibitors and AISI 1010

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material. The analysis of orthophospat content as an active compound in dukem inhibitors is done by FTIR and UV-vis spectrophotometer. The phenomenon of interaction between inhibitors and material is studied by FTIR, SEM and XRD. Corrosion test with potentiostat is performed to assess the optimal concentration of dukem inhibitor which should be added. From the results of FTIR analysis, it is known that the active compounds in dukem inhibitors are ortho-phosphate. The analysis using UV-vis spectrophotometer showed that orthophospat concentration is 4.2 ppm. The SEM analysis demonstrated the presence of an inhibitor layer, which is capable of masking the surface porosity. The AISI 1010 material has better corrosion resistance when inhibitor was injected to the coolant of 150 ppm. The corrosion rate decreased by by 45.20% from 10.95 mpy to 6.02 mpy. The type of dukem inhibitor is mixed type inhibitor. Visually, corrosion product was not formed in the AISI 1010 surface during immersed in the inhibitor solution but it is clearly adhered on surface when immersed in solution added by inhibitors. It can be concluded that dukem inhibitors can be used as inhibitors in RSG GAS secondary cooling systems.
Keywords: dukem, inhibitor, corrosion, secondary cooling system, RSG GAS.

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