

# Computational Analysis of Nuclear Safety Parameters of 3 MW TRIGA Mark-II Research Reactor Based on Evaluated Nuclear Data Libraries JENDL-3.3 and ENDF/B-VII.0

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The objective of this study is to explain the main nuclear safety parameters of 3 MW TRIGA Mark-II Research Reactor at AERE, Savar, Dhaka, Bangladesh from the viewpoint of reactor safety and also reactor operator. The most important nuclear reactor physics safety parameters are power distribution, power peaking factors, shutdown margin, control rod worth, excess reactivity and fuel temperature reactivity coefficient. These parameters are calculated using the chain of the computer codes the SRAC-PJ for cell calculation based on neutron transport theory and the SRAC-CITATION for core calculation based on neutron diffusion equation. To achieve this objective the TRIGA model is developed by the 3-D diffusion code SRAC-CITATION based on the group constants that come from the collision probability transport code SRAC-PJ. In this study the evaluated nuclear data libraries JENDL-3.3 and ENDF/B-VII.0 are used. The calculated most important reactor physics parameters are compared to the safety analysis report (SAR) values as well as earlier published MCNP results (numerically benchmark). It was found that the calculated results show a good agreement between the said libraries. Besides, in most cases the calculated results reveal a reasonable agreement with the SAR values (by General Atomic) as well as the MCNP results. In addition, this analysis can be used as the inputs for thermal-hydraulic calculations of the TRIGA fresh core in the steady state and pulse mode operation. Because of power peaking factors, power distributions and temperature reactivity coefficients are the most important reactor safety parameters for normal operation and transient safety analysis in research as well as in power reactors. They form the basis for technical specifications and limitations for reactor operation such as loading pattern limitations for pulse operation (in TRIGA). Therefore, this analysis will be very important to develop the nuclear safety parameters data of 3 MW TRIGA Mark-II reactor by developing the TRIGA model.